# ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

NOVEMBER 1954

PRICE FIFTY CENTS

FOUNDED 1866

*And what the ladies did in San Francisco*

*. . . See p 76*

New Products Review—What's New About Them—How They Will Help You

—What's New About Th

Products Review—What'

**E & M J's**
**New Products Review**
**Highlights of the Mining Show plus a handy guide to new equipment available from the nation's leading manufacturers to help you do a better job in mine, mill or smelter . . . . P 35**

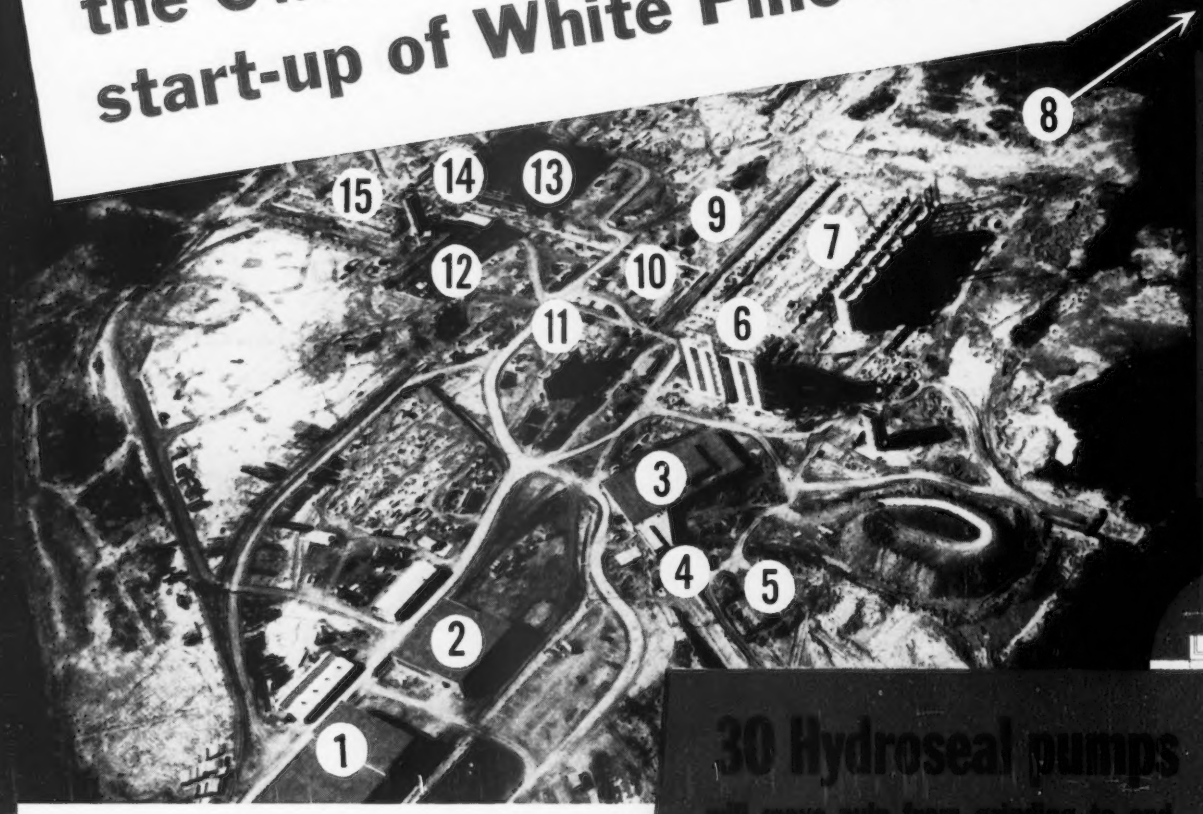
-How They Will Help

You— New Products

—What's New About

New Products Review—What's New About Them—How They Will Help You

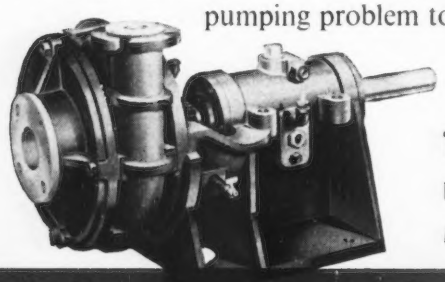
# WE SALUTE ...
# the Owners and Engineers on the start-up of White Pine Copper

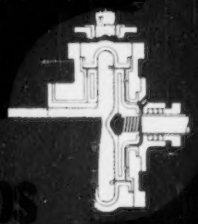



1—Warehouse & machine shop
2—Vehicle Repair
3—Mine change & transfer house
4—Mine portal
5—Transfer station
6—Secondary & tertiary crushers
7—Mill building
8—Tailing pond
9—Thickener
10—Filter building
11—Flux crusher
12—Smelter feed & bedding bldg.
13—Power Plant
14—Reverberatory furnace
15—Smelter

Air view of White Pine Copper Company's plant under construction southwest of Ontonagon, Michigan port on Lake Superior. Utilizing every modern facility, this largest post-war copper project is designed to mine 12,500 tons of ore daily on a 6-day schedule, to grind 10,500 tons daily on a 7-day cycle, and to add annually 75-million pounds of copper (99.9% purity) to U. S. production.

White Pine engineers insist that pumping be continuously efficient and economical. Their selection of Hydroseals is a good reason for referring *your* pumping problem to us.





## 30 Hydroseal pumps

**will move pulp from grinding to and through wet-way extraction processes**

Six of the 30 Hydroseal Slurry Pumps will handle the overflow from 12 classifiers. Another six will feed Primary Desliming cyclones. Four Hydroseals will serve for concentrate gathering. Six Hydroseals will distribute to regrind cyclones. Four Hydroseals will handle sand tailing, while four other Hydroseals will move slime tailing through separate discharge lines.

*Write today for new Hydroseal catalog.*

**THE ALLEN-SHERMAN-HOFF PUMP CO.**

**Dept. B—259 E. Lancaster Ave., Wynnewood, Pa.**

*Representatives throughout the World*

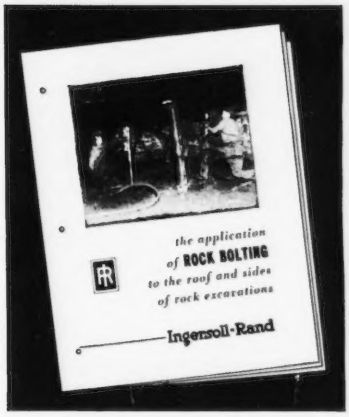
# HYDROSEAL and CENTRISEAL
## SAND, SLURRY & DREDGE PUMPS

MAXIMIX RUBBER PROTECTED

# EVERYTHING *for* ROCK BOLTING

## *from the bit* *to the compressor*

## A complete line of coordinated equipment that can help you pin down your rock-pinning costs




**FREE—NEW ROCK-BOLTING HANDBOOK**

This new 12-page booklet is the most complete and authoritative report thus far produced on rock bolting methods, applications and equipment. Ask your I-R representative for a copy—or write to Ingersoll-Rand for Bulletin 4155.

SAVE TIME with longer-lasting, faster-drilling Carset Jackbits and light-weight, hard-slugging RP-38 "Short Leg" Stopers, (single or telescopic feed leg.)

SAVE EFFORT with easy-handling, Size 534 Impact Wrench that tightens bolts without any kick or twist to the operator.

SAVE EXPENSE with compact, efficient Type 40 air-cooled compressors—electrically driven, easy to install or move from place to place.

SAVE TROUBLE by letting your Ingersoll-Rand representative take full responsibility for your rock bolting requirements.

5-90

**Ingersoll-Rand**

ROCK DRILLS • COMPRESSORS • AIR TOOLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL & GAS ENGINES

# ENGINEERING AND MINING JOURNAL

88th YEAR OF PUBLICATION

A McGRAW-HILL PUBLICATION

VOL. 155 No. 11

NOVEMBER 1954


## FEATURE ARTICLES


Editorial ..... 71

How USBM Metallurgists Are Solving the Manganese Shortage ..... Charles Prasky 72

What the Ladies Did at San Francisco ..... 76

How Sulphide Volatilization Can Be Used in Metallurgy ..... A. W. Schlechten 81

Factors Which Should Be Considered in Selecting a Mine Hoist Drive ..... R. B. Moore 84

Basic Break-Even Formulas Devised to Simplify Mine Evaluation ..... H. M. Callaway 90

Industrial Quarry Gun ..... W. G. Davis 93

330 Years of Mining at Kongsberg ..... Harald N. Ross 94

How Sheffield's Beneficiation Plant Upgrades Texas Iron Ores ..... C. Leonard Lloyd 98


## REGULAR DEPARTMENTS


New Products Digest 35

Outlook ..... 67

Markets ..... 68

Behind the By-Lines ..... 70

Operating Ideas ..... 101

Washington Impact ..... 108

Personals ..... 114

This Month in Mining 118



Alfred M. Staehle ..... Publisher

Robert H. Ramsey ..... Editor

Alvin W. Knoerr, Managing Editor

John B. Huttl, Associate Editor, San Francisco

John H. Kearney, News Editor

Daniel P. Eigo, Copy Editor

Hans H. Wanders, Market Editor

George H. Cleaver, Assistant Editor, Markets

F. Alvin Zimmerli, Assistant Editor, Layout

George P. Lutjen, Associate Editor

McGraw-Hill Washington Bureau

Morton A. Reichek, Natural Resources

Alan E. Adams, Labor

Carl Coash, Advertising Sales Manager



Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder.

Publication Office, 1309 Noble St., Philadelphia 23, Pa. Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Executive Vice President. Publications Division; Ralph B. Smith, Vice President and Editorial Director; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation.

Subscriptions: Address correspondence to Engineering and Mining Journal — Subscription Service, 1309 Noble St., Philadelphia 23, Pa., or 330 West 42nd St., New York 36, N. Y. Allow one month for change of address.

Subscriptions are solicited only from management, production and maintenance executives and engineers in the metal and nonmetallic mining and refining industry. Position and company connection must be indicated on subscription orders.

Branch Offices and District Managers: Atlanta 3, S. T. Henry; Chicago 11, F. W. Roets, G. A. Mack; Cleveland 15, W. M. Spears; Dallas 1, J. H. Cash; Los Angeles 17, C. W. Dysinger; New York 36, T. E. Alcorn, John B. Lewis; Pittsburgh 22, H. C. Chellson; Philadelphia 3, W. A. Potter; St. Louis 8, F. W. Roets; San Francisco 4, J. W. Otterson; Washington 4, D. C. London Address: McGraw-Hill Publishing Co., Ltd., McGraw-Hill House, 95 Farringdon Street, London E. C. 4, England. Cable address: McGraw-Hill, London.

News Bureaus: Atlanta 3; Cleveland 15; Detroit 26; Houston 25; San Francisco 4; Washington 4.

World News Offices: London, Frankfurt, Manila, Mexico City, Paris, Sao Paulo, Tokyo.

Price of this issue 50c. Subscription rates: United States and possessions, $3 a year, $4 for 2 years, $5 for 3 years. Canada, $5 a year, $8 for 2 years, $10 for 3 years. Other Western Hemisphere, $8 a year, $12 for 2 years, $16 for 3 years. Elsewhere, $15 a year, $25 for 2 years, $30 for 3 years.

Please indicate position and company connection in all subscription orders.

Entered as second class matter, May 24, 1951, at the Post Office at Philadelphia, Pa. under the Act of March 3, 1879.


Copyright 1954 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Printed in U.S.A.


# LETTERS

### Bolidens Scraper

SIR:

I would like to point out to *E&MJ* readers a serious, but unintentional omission in my story of the origin of scraper loading into close coupled cars at the Fosdalens mine in Norway (*E&MJ*, August 1954, p 95).

I indicated that the system was developed at Fosdalens. A letter from Fosdalens general manager, Thor Amdahl, states that this is incorrect and that the system was developed by Bolidens Gruvaktiebolag in Sweden and that Fosdalens built their own scraper loader and modified their Granby-type cars for that system of loading rock.

Mr. Amdahl told me when I visited Fosdalens that Bolidens had originated this system but I overlooked mentioning it. I am glad to make this correction and to give Bolidens full credit for developing this method of scraper loading into close coupled cars.

C. C. AUSTIN
*Menlo Park, Calif.*

*Ed: E&MJ is pleased to publish the full information on the origin of the scraper loading technique. Mr. Amdahl, in correspondence with Mr. Austin, also spoke of the generosity of Bolidens in giving him and his company information and aid in designing the Fosdalens system.*

### Dynamite in Mexico

SIR:

Knowing that the *Engineering & Mining Journal* prides itself on accuracy in reporting, I should like to call your attention to an article published in the July issue. On p 154, under the heading "Mexico," appears the following statement:

"Inflation, which has tied a kite to the price of dynamite, may force many small mine operators out of business. Dynamite and other blasting materials which cost 28 pesos in 1952 now cost 108 pesos. National Federation of Small Scale Miners' Associations has appealed to President Adolfo Ruiz Cortines, who has turned over their plea to the Ministry of National Economy. The Federation told the President that the price increase is out of proportion to the 45% slash in the value of the peso."

The actual facts are as follows concerning the price of 40% Gelatine Extra, which is a type of dynamite very widely used in underground mines in Mexico. This comparison is entirely in proportion to changes in price of all other grades of dynamite.

| | | | Per 50 lb case | |
|---|---|---|---|---|
| *Prices in effect* | | *Rate of exchange* | *Mexican Dollars* | *Pesos* |
| December | 1950 | 8.65 | 9.50 | 82.20 |
| March | 1952 | 8.65 | 9.75 | 84.35 |
| May | 1954 | 12.50 | 9.55 | 119.40 |

As is well known, high explosives are manufactured from basic raw materials


(*Continued on p. 112*)

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

# Rubber belt drains off water to speed ore washing

RIDING up that conveyor belt is crushed iron ore, still sopping wet from the washing that removes sand or silica.

As you can see, this is no ordinary belt. If it were, water seeping down through the ore would form a pool at the bottom of the belt trough, and wash the ore down the 20° incline. That's why the Riffle Grip belt you see here was recommended by B. F. Goodrich.

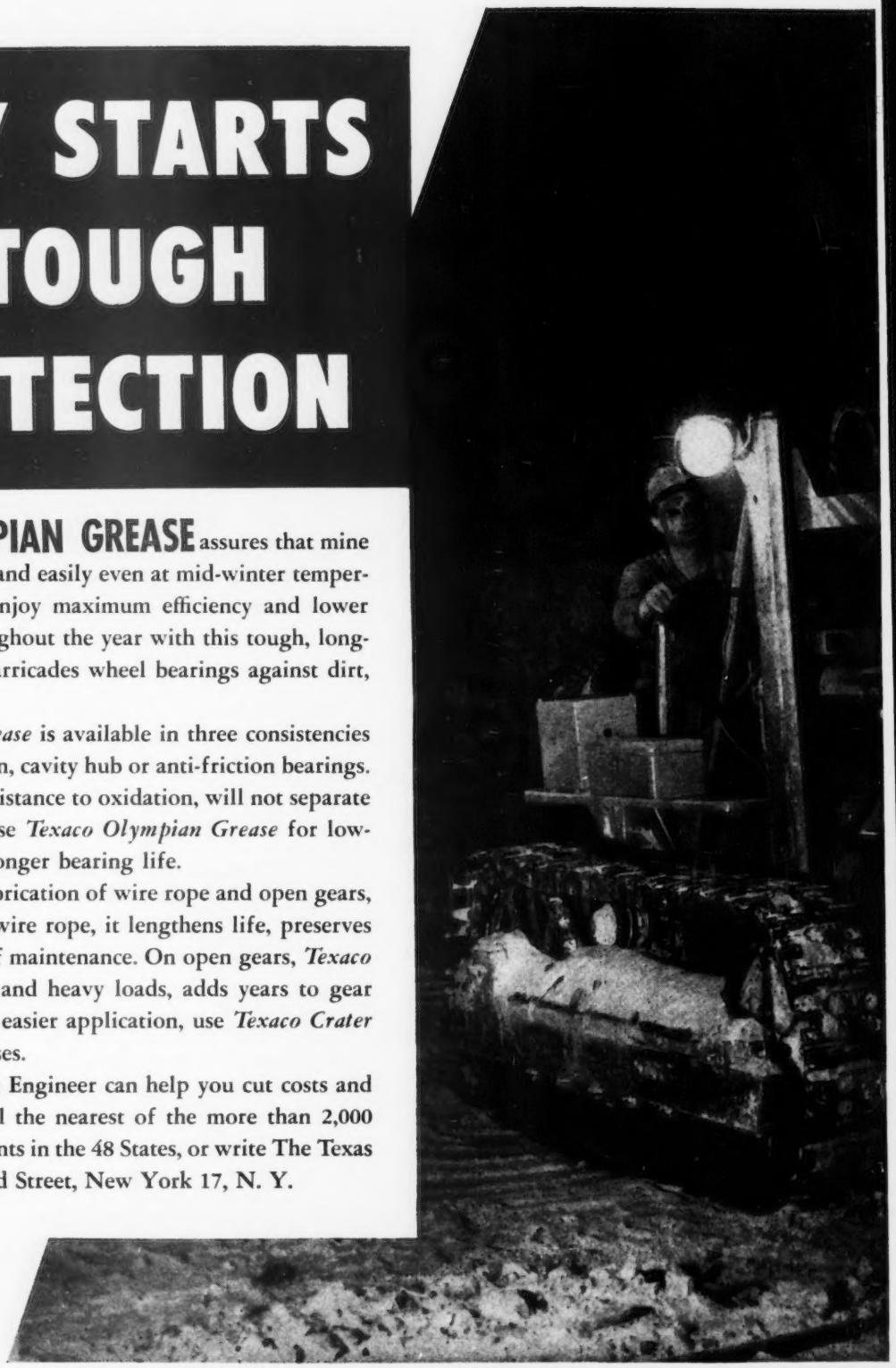
You'll notice that the Riffle Grip belt has a series of rubber ridges molded into the cover. It's this tread with angular steps that holds the ore in place, and, at the same time, channels water to the edges of the belt where it flows off. B. F. Goodrich engineers developed this belt to solve a gold dredging problem. And it is such an improvement over ordinary belts that it's now widely used in mining operations, sand and gravel plants, and other places where wet materials must be carried up steep inclines.

This same belt works equally well on jobs where moisture must be *held*. By changing the incline angle and the troughing idlers, the steps become a series of horizontal ribs which can carry such sloppy materials as wet mixed concrete and keep the water from draining away.

With its ability to shed water or retain it, as the job requires, the B. F. Goodrich Riffle Grip belt is making many mining and processing jobs cheaper, more efficient. Your BFG distributor will give you complete details on how this unusual belt can solve your wet material handling problems. Or write *The B. F. Goodrich Company, Dept. M-333, Akron 18, Ohio.*

**B.F. Goodrich**
**INDUSTRIAL PRODUCTS DIVISION**

# EASY STARTS _TOUGH PROTECTION



**TEXACO OLYMPIAN GREASE** assures that mine cars will start smoothly and easily even at mid-winter temperatures. In fact, you'll enjoy maximum efficiency and lower maintenance costs throughout the year with this tough, long-lasting lubricant that barricades wheel bearings against dirt, moisture and wear.

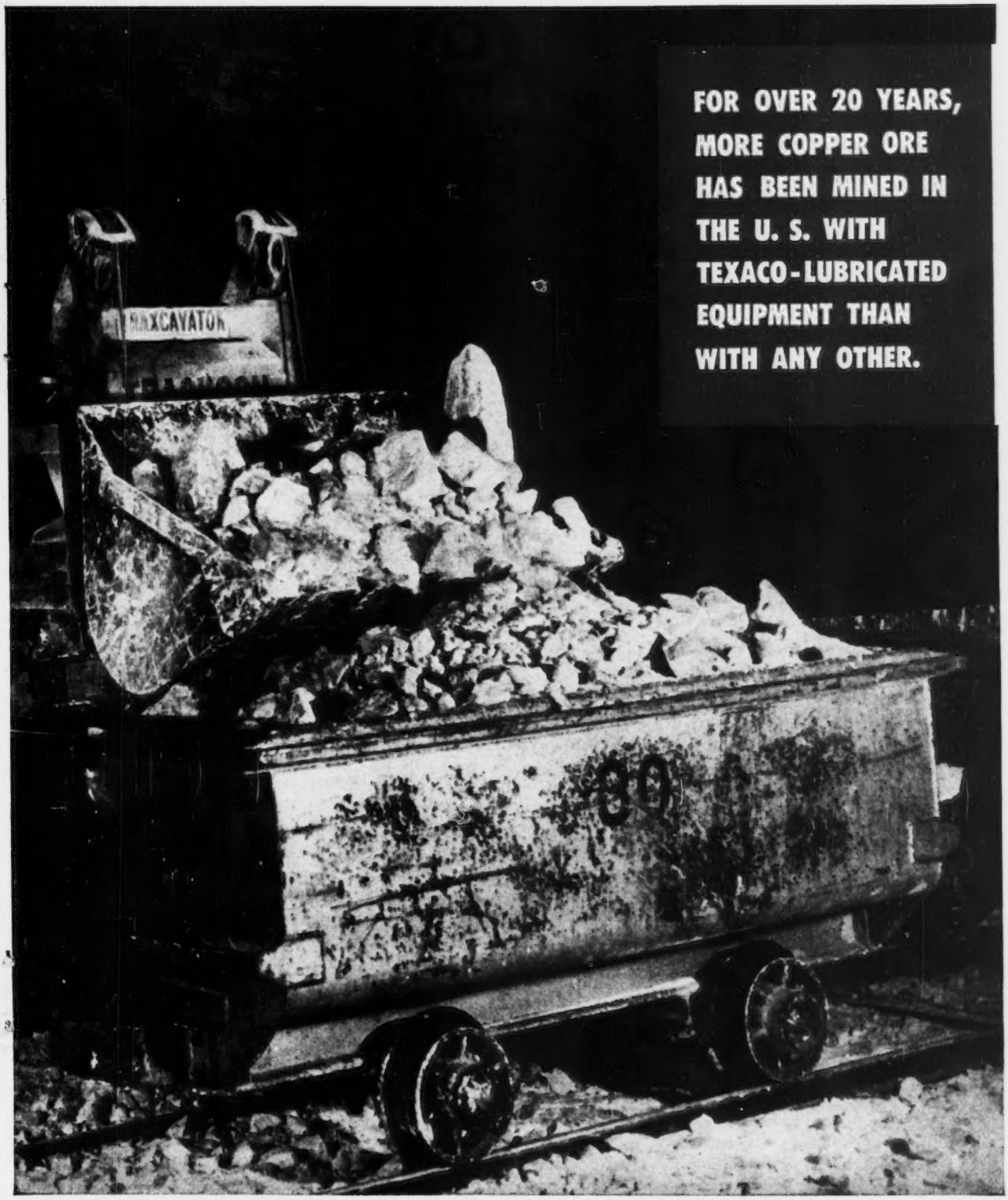
*Texaco Olympian Grease* is available in three consistencies to meet all needs of plain, cavity hub or anti-friction bearings. It shows outstanding resistance to oxidation, will not separate in service or storage. Use *Texaco Olympian Grease* for low-cost performance and longer bearing life.

To assure effective lubrication of wire rope and open gears, use *Texaco Crater*. On wire rope, it lengthens life, preserves strength, cuts the cost of maintenance. On open gears, *Texaco Crater* cushions shocks and heavy loads, adds years to gear life. If you prefer even easier application, use *Texaco Crater X Fluid* for both purposes.

A Texaco Lubrication Engineer can help you cut costs and raise efficiency. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

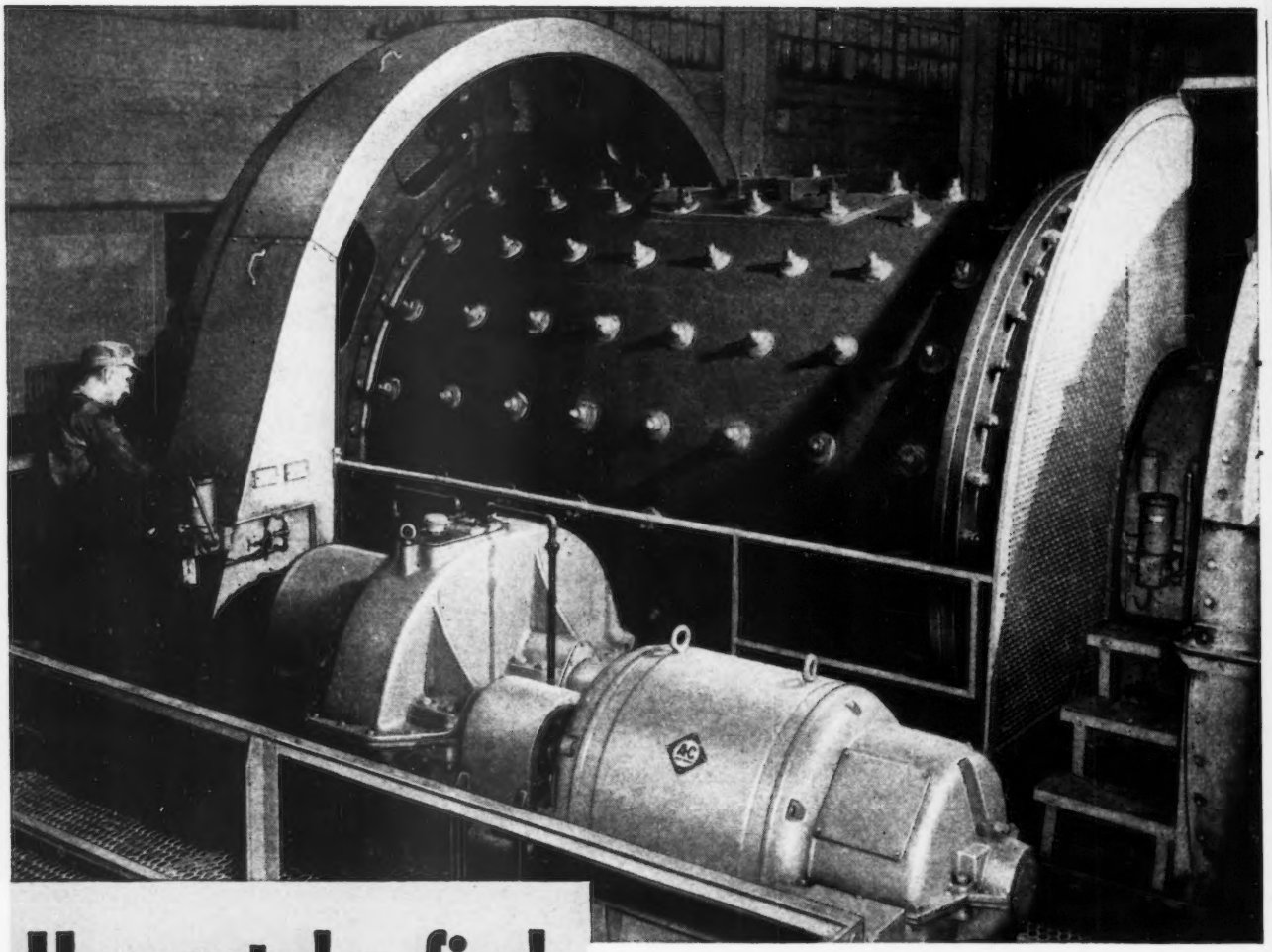
TUNE IN...TEXACO STAR THEATER starring DONALD O'CONNOR or JIMMY DURANTE on television... Saturday nights, NBC.

TEXACO




# Lubricants and Fuels

## FOR THE MINING INDUSTRY



# Homestake finds Gold in MODERNIZATION

## *Industry's Top Technical Team Helps Reduce Operating Costs*

**A 2.25 kwhr saving per ton in power consumption — a 37½% reduction in operating labor—a similar saving in maintenance and supply work — considerable space conservation. These benefits realized by Homestake Mining are gilt-edged proof that modernization pays.**

Pressured by increasing labor and material costs, in the face of a fixed price on gold, Homestake took a long, hard look at its gold ore operation. With the *help of Allis-Chalmers,* the Homestake staff made a comprehensive study of all phases of ore treatment. Crushing and grinding flow sheets were drawn up and costs estimated. Machines were operated under varying conditions. Power measurements, product analyses and man-hour appraisals were made in a pilot plant run.

As a result of this thorough investigation, a modernization program was launched in each of Homestake's two crushing plants and mill. New equipment was installed and procedures modified to make existing equipment as efficient as possible. Two years of profitable operation have proved that Homestake Mining has struck a rich vein in modernization. A-4470

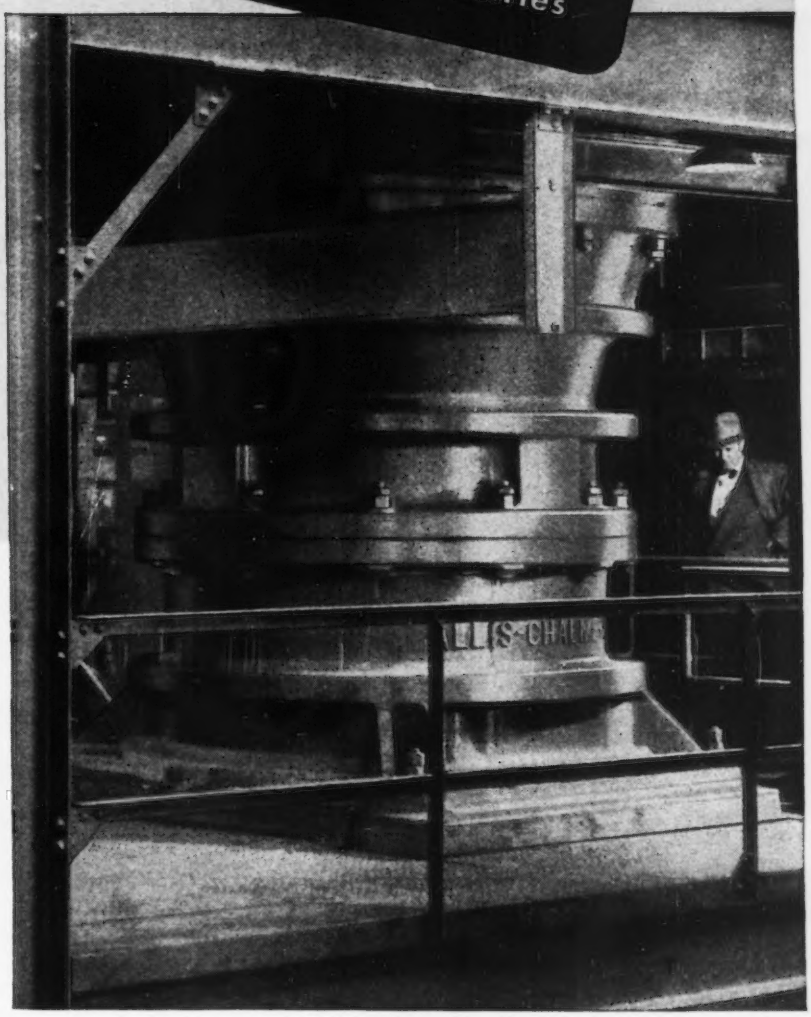
**ALLIS-**

**ALLIS-CHALMERS**
Equipment for the Mining and Rock Products Industries

Prominent in the modernization picture at Homestake are three 9 by 11-foot Allis-Chalmers ball mills. These mills, used in the amalgamation process, are equipped with combination drum and double-scoop feeders. Liners are of the Lorain type with hardened lifter bars. Ball additions are 1½ to 2 inches. The mills are driven by 450-hp, 1200-rpm Allis-Chalmers motors through speed reducers.

In each of Homestake's two crushing plants, a modern 30—55 *Superior* gyratory crusher has replaced two outmoded 17-inch primary crushers. The new crusher outproduces the combined tonnage of the old crushers and takes up less than half the space. The wearing quality of manganese steel mantles and the strength of short, rigid mainshaft have cut maintenance and parts replacement costs.

Superior is an Allis-Chalmers trademark.



**For as Much Help as You Want or Need in Your Modernization Planning, Contact Allis-Chalmers**

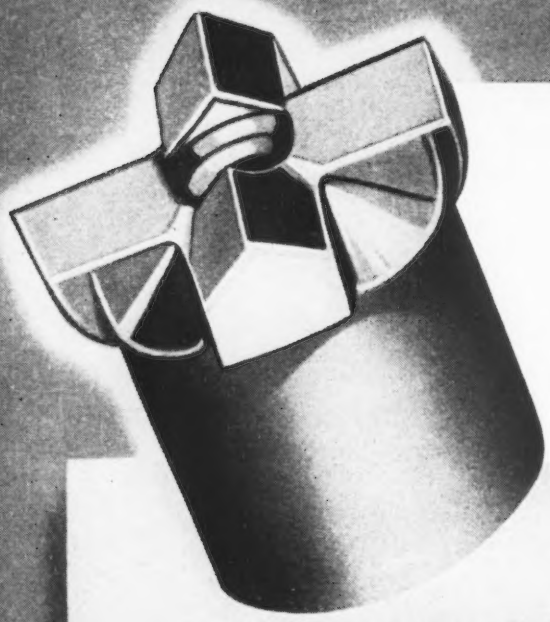
Your A-C representative, backed by industry's top technical team, is always ready to help you or your consultants. A-C interest in your problems does not end with the installation of equipment. Laboratory facilities, periodic checkups, maintenance and fast emergency parts service are yours continuously.

**Crushers—all types**
**Vibrating Screens—all types... Grinding Mills—all types**
**Kilns...Coolers...Washers...Dryers...Smelting Equipment**

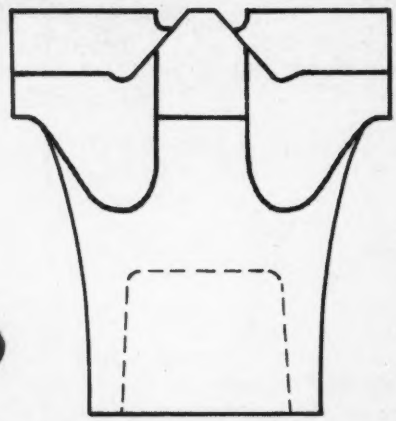
# CHALMERS

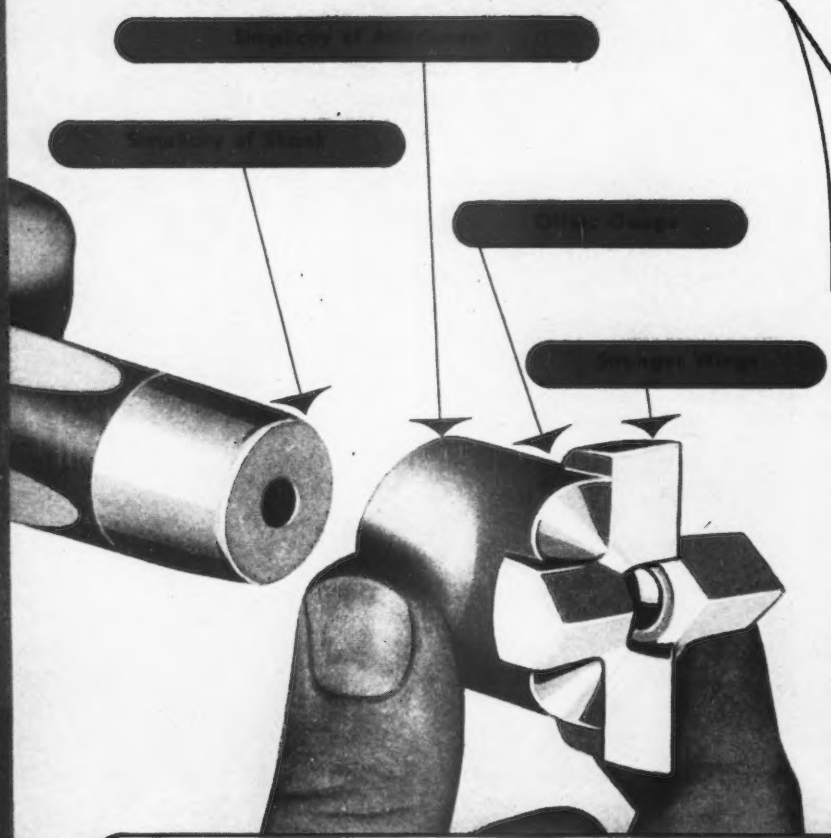
A-C ALLIS-CHALMERS

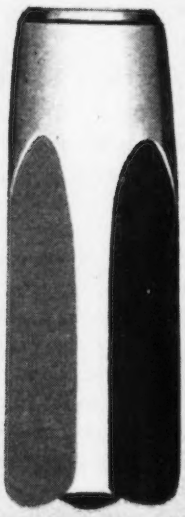
**For complete information, call your Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wis.**



# Here's another







The union of the bit and the rod after drilling has a cohesive strength of several tons . . . A sharp blow of sufficient weight on the end of the bit skirt will serve to detach the bit from the rod.

## SPECIFICATIONS

Mines everywhere cut drilling costs with CRD DETACHABLE DRILL BITS • 4 - Wing Type - Center Hole - Side Hole

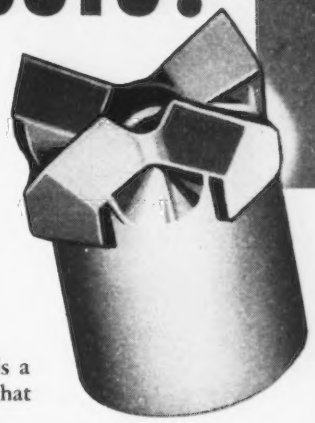
| | | |
|---|---|---|
| Class "A" Bits<br>For class "A" drill steel connection on any steel. Best suited to 7/8" steel. | 1-1/4 | Aluminum |
| | 1-5/16 | Pink |
| | 1-3/8 | Deep Green |
| | 1-7/16 | Brown |
| | 1-1/2 | Grey |
| | 1-9/16 | Maroon |
| | 1-5/8 | Deep Blue |

| | | |
|---|---|---|
| Class "B" Bits<br>For class "B" drill steel connection on any steel. Best suited to 1", 1⅛" and 1-¼" steel. | 1-7/16 | Orange |
| | 1-1/2 | Green |
| | 1-9/16 | Yellow |
| | 1-5/8 | White |
| | 1-11/16 | Black |
| | 1-3/4 | Red |
| | 1-13/16 | Blue |
| | 1-7/8 | Tan |
| | 1-15/16 | Plain |
| | 2 | Pink |
| | 2-1/8 | Maroon |
| | 2-1/4 | Aluminum |

Cans are labeled showing size of steel socket, gauge of bit, and color.

# way to cut drilling costs!

## Use CLEVELAND one-use CRD Detachable Bits



Lower cost per foot of hole — that's the goal of everyone who has rock to drill. And that was the goal of CLEVELAND engineers, too. They didn't fool around with the problem either. Fifty years of experience in designing rock drills was put to work. The result — a one-use detachable bit that can save you money in a wide variety of applications.

This designing job wasn't done overnight. You can't produce the results our engineers were after in such a short time. Instead, these bits were put to work—and, for a number of years they have helped reduce drilling costs materially in mines, in quarries, and on construction jobs.

That's why we offer them to you now — with complete confidence in their ability to help you improve your rock-drilling cost picture.

### These Features Mean Lower Drilling Costs for You

**Faster Drilling Speed** — Special offset gauge feature, which permits the use of thinner wings and a steeper reaming angle, greatly reduces binding and provides ample clearance for cuttings. Result is a free, fast-cutting chiseling action that gives you greater drilling speed.

**Less Drill-Steel Breakage** — The method of attachment used with the CRD bit eliminates threads on the drill rod. Since a drill rod is only as strong as the root diameters of its threads, the tapered threadless CRD design provides longer drill-steel life — reduces drill-steel handling and reconditioning costs.

**Lower Rock Drill Repair Costs** — Because the CRD bit design reduces binding in the hole, there is less strain on the rotation parts of your rock drills. Rifle bars, rifle nuts, and chucks last longer. You get more drilling done at lower cost.

Since no special equipment is needed to thread rods, you owe it to yourself to try a can of CRD bits. They're ideal for roof bolting and for use in your stopes as well as in your headings. A short trial will give you first hand information on the ability of these bits to cut drilling costs in your property as they have in so many others.

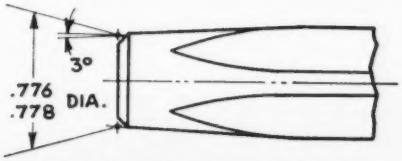
Bulletin RD-29 gives detailed information. A copy is yours for the asking — just write for it. RD-58

**CLEVELAND ROCK DRILL DIVISION**

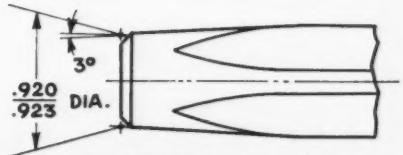
**Westinghouse Air Brake Co.**

12500 BEREA ROAD • CLEVELAND 11, OHIO

*Plants:* Milwaukee, Wis. • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Mich.




Taper shank dimensions for ⅞" steel.
Class A Bits




Taper shank dimensions for 1" hex,
1" Q.O., 1⅛" and 1¼" rd. steel.
Class B Bits

The taper attachment shank used with the CRD bit is easy to make. You need no dies or other expensive threading equipment. Several simple, low-cost methods can be used for preparation — grinding, forging or machining.

Location of First Fork Dam at Sinnemahoning, Pa. This important flood-control project is being built by General State Authority of the Commonwealth of Pennsylvania.

Interior view of 1150-ft diversion tunnel. Workers are chipping off the loose rock, preparatory to mucking out. Bethlehem Hollow Drill Steel was used in making the 20-ft bore. For greater safety, Bethlehem Roof Bolts were driven into rock in tunnel roof.

# New 1150-ft Tunnel is Part of Pennsylvania Flood-Control Project

One of the most ambitious flood-control projects yet attempted by the General State Authority of the Commonwealth of Pennsylvania is now underway on the First Fork Sinnemahoning Creek. The project is called the First Fork Dam. It is aimed at alleviating damage caused by floods on the West Branch of the Susquehanna River, in Cameron and Potter Counties.

Upon completion in 1956, the 1650-ft long dam will have a 170-ft-high stone and earth embankment, and a 210-ft-high concrete intake structure.

Part of the project is a diversion and water-control tunnel, hewn through solid rock in an adjacent mountainside. This subterranean channel, now in operation, diverts the First Fork Sinnemahoning Creek. It has a two-fold purpose—facilitating the closing of a gap in the breastwork of the dam, and providing for the normal flow of the stream.

The tunnel consists of a 20-ft-diameter bore, 1150 ft long. After lining with concrete, its finished diameter was 16 ft. Construction of the tunnel necessitated the removal of 14,500 cu yd of medium-hard and abrasive grey sandstone and red shale.

The sub-contractor for the tunnel, Lewis and Bowman, Inc., Goldsboro, N. C., used a large quantity of 1 in. hexagon Bethlehem Hollow Drill Steel, fitted with carbide-insert bits. The rock footage drilled by stopers, drifters and jumbos was approximately 55,000 ft. Blast holes were 10 ft deep. Reconditioning was done by Howells Mining Drill Company, Plymouth, Pa. Prime contractor for the project was Nello L. Teer Company, Durham, N. C.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

**Two Grades of**

# BETHLEHEM HOLLOW DRILL STEEL

**CARBON • ULTRA-ALLOY (chrome moly)**

BETHLEHEM STEEL

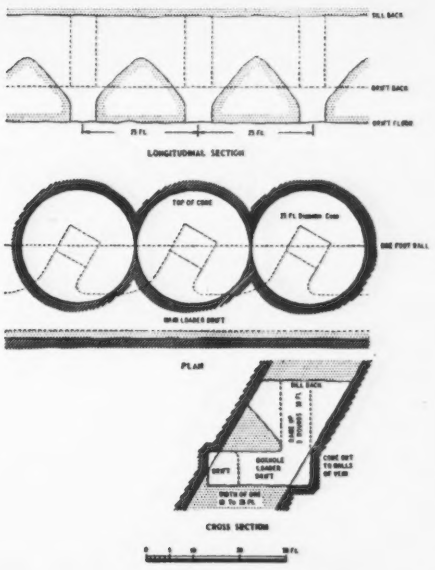
# INCREASE PRODUCTION LOWER COSTS

Yes! You can increase production and lower costs by using Eimco loaders to load your production tonnage.

The advantages of being able to load larger pieces, use less powder, practically eliminate secondary blasting and absolutely eliminate expensive chutes and grizzlies, will enable your mine to get into production in a new area faster at less expense.

That's why so many mining men are traveling to see mines that have changed their systems to production loading with Eimcos.

Many different ideas for saving time and lowering costs have been developed by operators to fit their particular conditions. A sketch of one of these is at right. Eimco engineers have helped work out numerous systems, they will be glad to help you. Write Eimco for information.

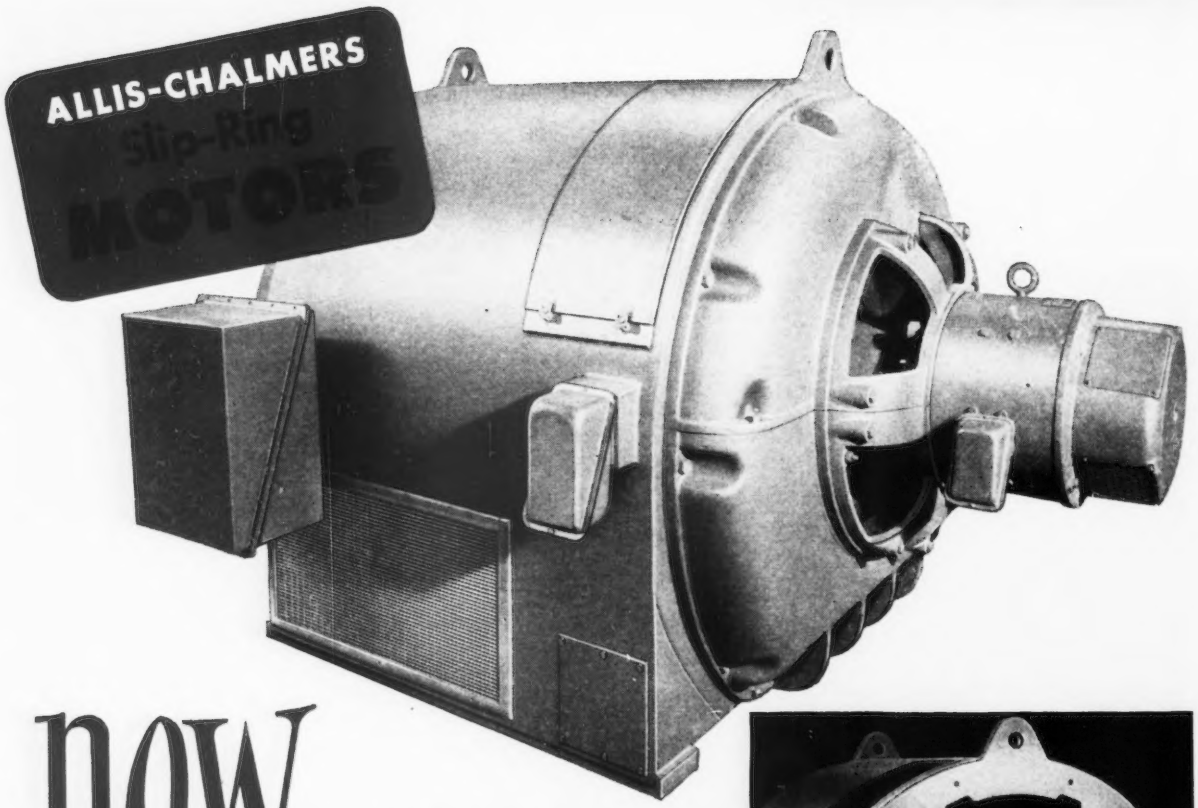



**THE EIMCO CORPORATION**

**Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City**

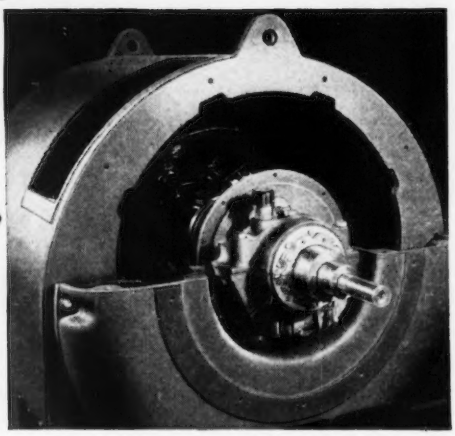
New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Texas Birmingham, Ala. Duluth, Minn. Kellogg, Ida. London, Eng. Paris, France Milan, Italy

*You Can't Beat An Eimco*




# new DESIGN...

## more protection with full accessibility



* New Allis-Chalmers slip-ring motor with inspection cover and upper half of end shield removed. Note accessibility of brushes, protection of bearing.

ALLIS-CHALMERS LARGE SIZE SYNCHRONOUS AND WOUND-ROTOR MOTORS have been completely redesigned with longer stator yokes and shorter end shields. Collectors and brushes are located inside the yoke for protection against physical damage, dripping moisture, dust and dirt.

Capsule-type bearings give better bearing protection, too. The upper half of the end shield may be removed for inspection or cleaning of the interior of the motor without disturbing the exciter or exposing the bearing to the ravages of dirt, dust and oil contamination.

**All leads enclosed** — Both primary and secondary winding leads are brought out through separate conduit boxes. There is no loose wiring . . . no exposed leads anywhere.

**Easy maintenance** — Even though the new design offers maximum protection to brushes and collectors, internal parts are fully accessible for inspection and maintenance through large openings in the stator yoke. Opening covers are readily removed and are secured during operation by easy-operating, self-locking fasteners.

**Get details now** — This new design is available from approximately 250 hp at 300 rpm and up, in drip-proof and splash-proof construction. Call your Allis-Chalmers representative for complete details or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 05R8183. A-4464

# ALLIS-CHALMERS

# The "handyman" around the mill!

## What it will do!

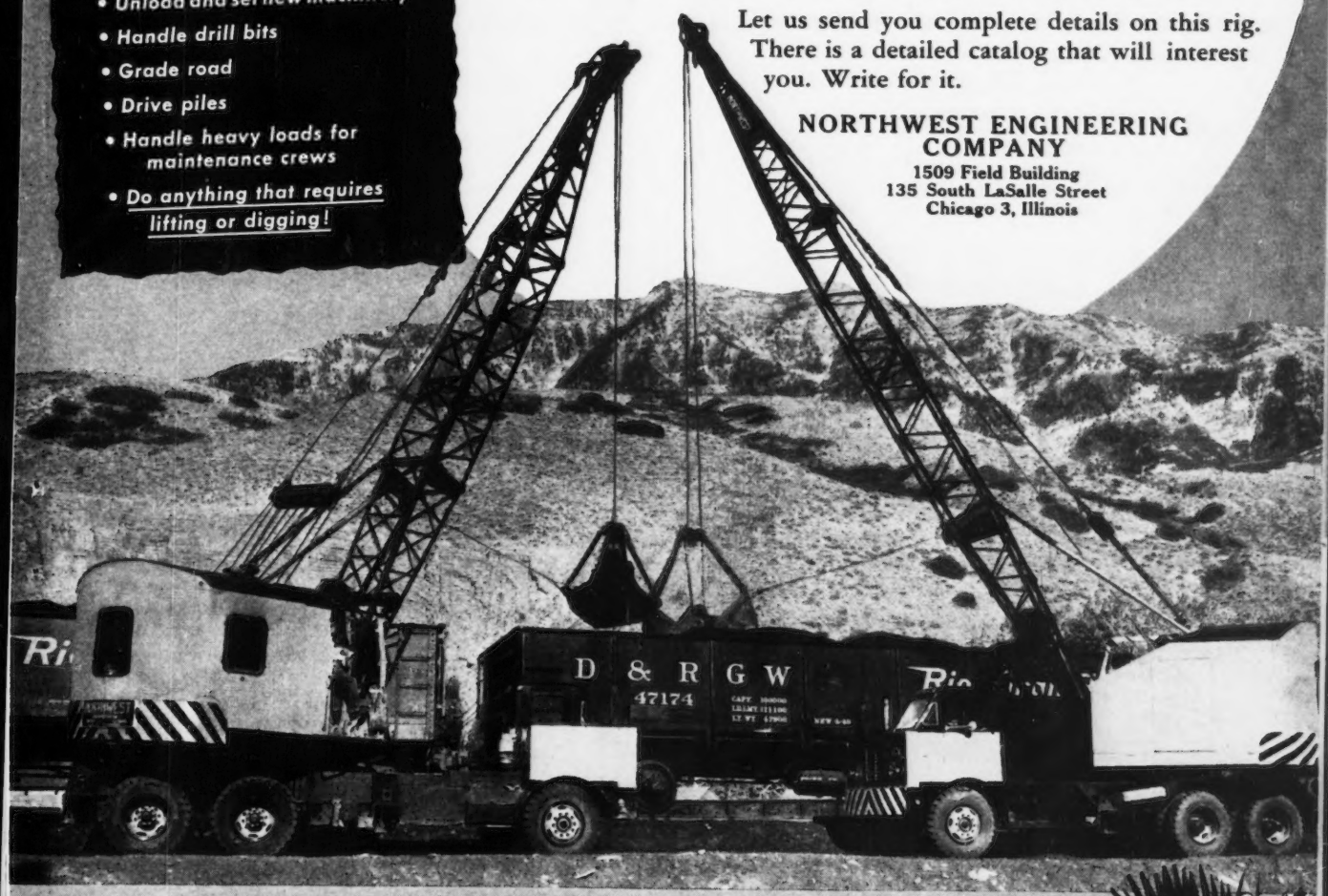
- Load and unload cars
- Ditching work for drainage
- Set track
- Handle concentrate
- Unload skulls
- Handle mine timbers
- Handle steel
- Move equipment
- Unload and set new machinery
- Handle drill bits
- Grade road
- Drive piles
- Handle heavy loads for maintenance crews
- Do anything that requires lifting or digging!

HERE'S a piece of equipment you can put almost anywhere a truck will go! It will serve on maintenance and repair jobs where heavy lifting is required. It will save money on new construction either on building, on road work or on railroad jobs. It will handle any type of material, drive piles, swing a magnet, dig ditch, set new machinery! What is your problem?

The Northwest Truck Crane brings you a combination of advantages found in no other similar equipment. It combines all the Northwest Crane advantages, the "Feather-Touch" Clutch Control for easy operation, Uniform Pressure Swing Clutches, a choice of Boom Hoist Equipment, cast steel machinery bases and side frames and many other advantages with improvements in Truck design and construction that assure easier operation and greater versatility.

Let us send you complete details on this rig. There is a detailed catalog that will interest you. Write for it.

**NORTHWEST ENGINEERING COMPANY**
1509 Field Building
135 South LaSalle Street
Chicago 3, Illinois



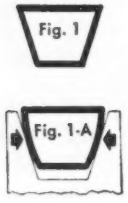

# NORTHWEST

*Convertible for any Mining Material Handling or Excavation Problem*

Has Your Shovel Stood the ROCK TEST

# This simple idea saves money in V-Belt Costs

*You can prove it in two minutes!*

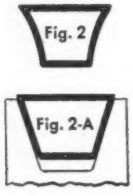



To prove how the CONCAVE SIDES of GATES VULCO ROPES *save money,* just make this simple test—

Bend *any* V-Belt that has *straight sides* (Fig. 1) and—as the belt bends—*feel* the sides *bulge out* (Fig. 1-A). This out-bulge concentrates the wear at the points shown by arrows—and this naturally shortens the life of a *straight-sided* belt!

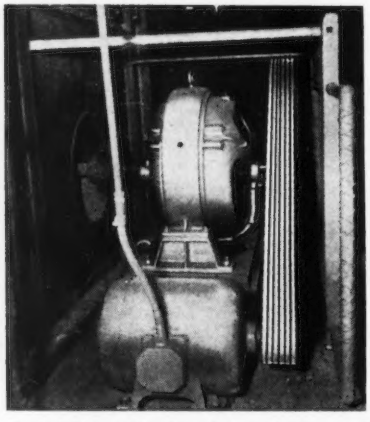
## Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

(U. S. PAT. 1813698)




You find that the CONCAVE SIDES *fill out* and become perfectly straight. They thus press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the GATES VULCO ROPE—and this means *longer* belt *life* and *lower* belt *cost* for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the GATES VULCO ROPE!



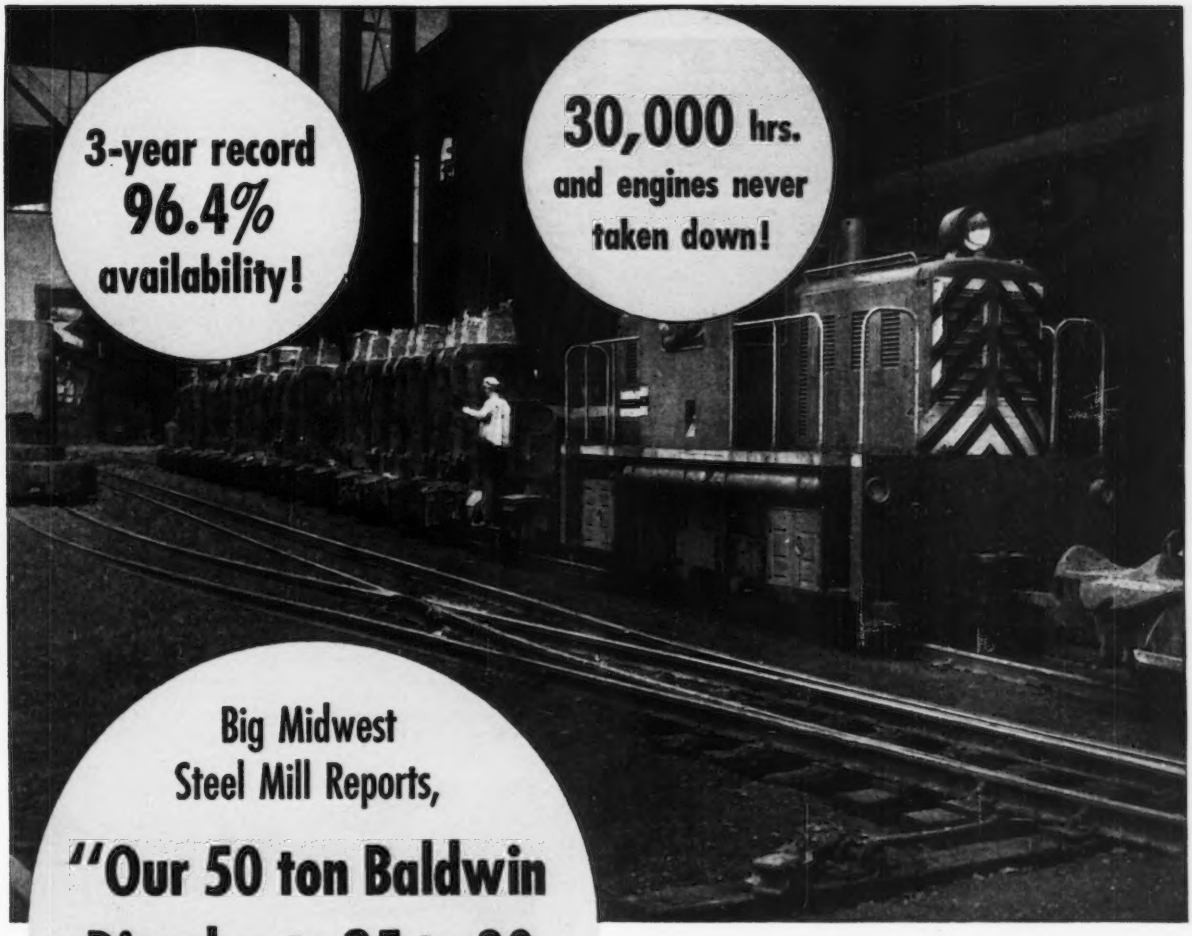
Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

VULCO ROPE DRIVES

THE GATES RUBBER COMPANY
DENVER, U.S.A.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

CS-549




## Big Midwest Steel Mill Reports,

# "Our 50 ton Baldwin Diesel gets 25 to 30 heats out on time every day!"

When it costs hundreds of dollars for every delay of a minute in getting a heat out and the ingots to the blooming mills and soaking pits, efficient, dependable locomotives are indispensable to a steel mill. A major steel mill in the midwest reports a remarkable record of money-saving performance by their Baldwin industrial diesel-electric locomotive:

"Our 50-ton Baldwin replaced two steam locomotives on the hot line moving ingots to the blooming mills and soaking pits. We tap 8 to 10 heats a shift, three shifts a day. The heats run as much as 150 tons, making many of the loads for the Baldwin 594 tons which theoretically would require a 32% heavier diesel. But this Baldwin has handled *every* job 24 hours a day for over 3 years in spite of the extreme heat, bad curves and rough track conditions on this run. It is taken off the job each week two hours for inspection and lubrication. No major repairs have been necessary during 30,000 hours of operation."

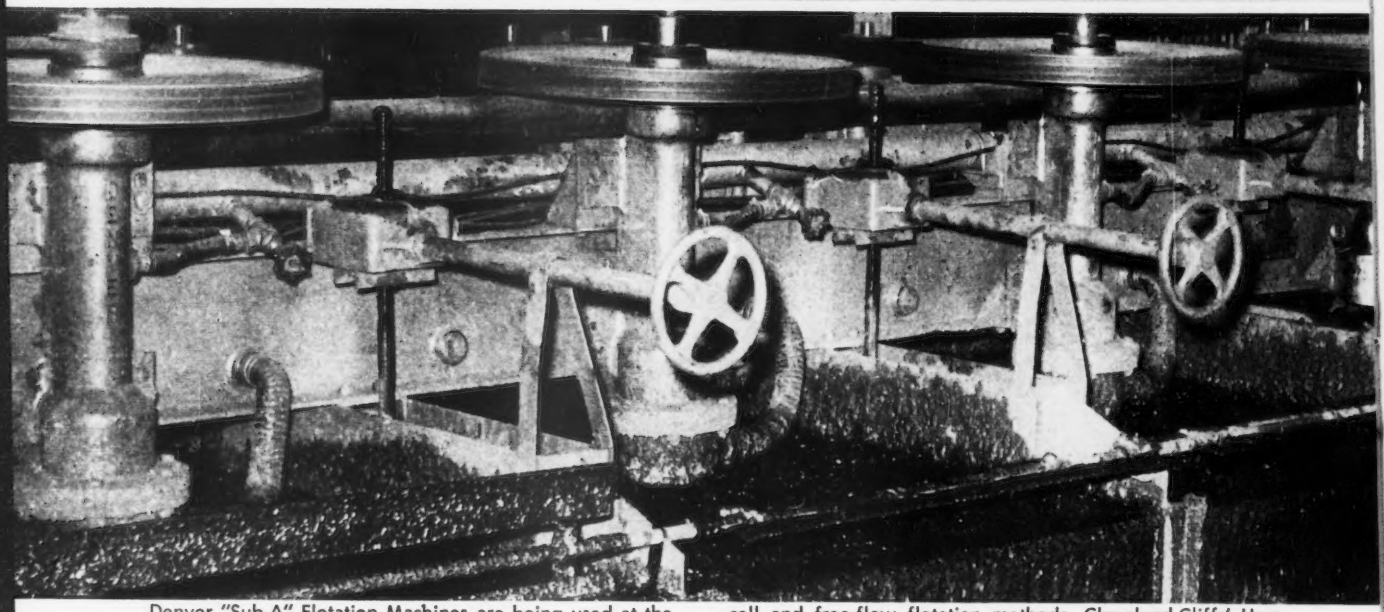
In mine or mill, you, too, can depend on similar economy and dependability by switching to and with Baldwin Industrial locomotives.

BALDWIN · BLH · LIMA-HAMILTON

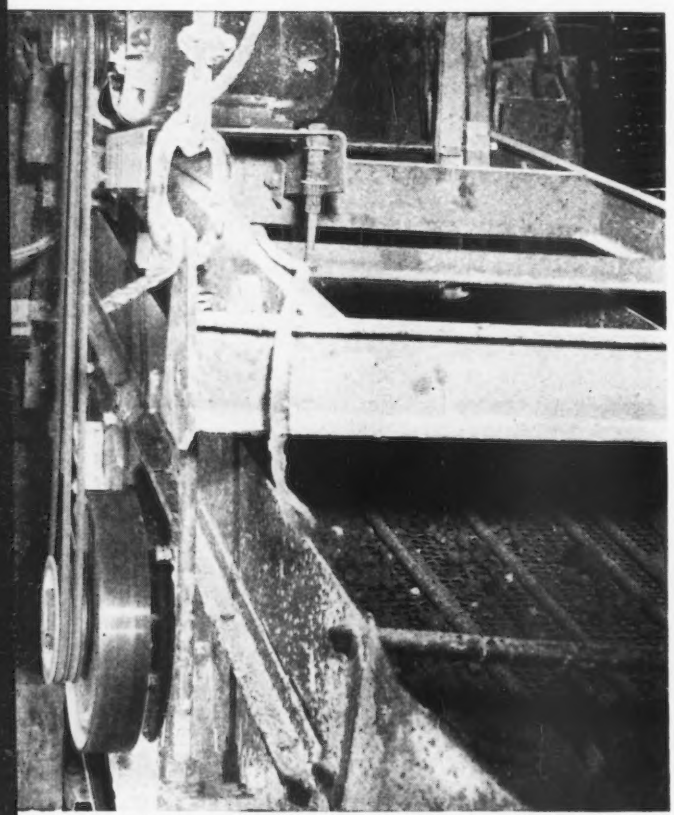
**BALDWIN – LIMA – HAMILTON**

INDUSTRIAL LOCOMOTIVES

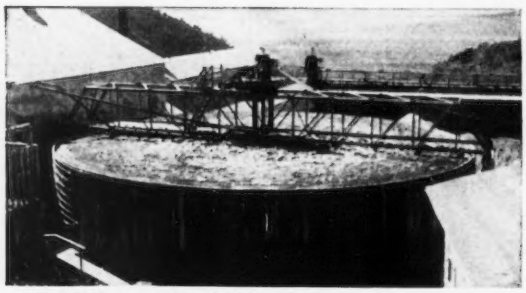
# DENVER EQUIPMENT



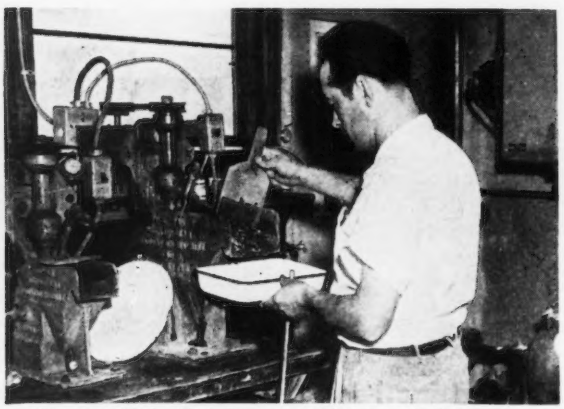
Denver "Sub-A" Flotation Machines are being used at the mill of the Humboldt Mining Co., operated by the Cleveland-Cliffs Iron Co., near Ishpeming, Mich., to float specular hematite iron ore. A fatty acid reagent is used. This photo shows a No. 24 (43x43) Denver "Sub-A" Flotation Machine in the Rougher Circuit. This bank of cells incorporates both cell-to-cell and free-flow flotation methods. Cleveland-Cliffs' Humboldt Mill is also using Denver "Sub-A" Flotation Machines for cleaners and recleaners. Additional information on how Denver "Sub-A" Flotation and Denver "Sub-A" Super Rougher Flotation Machines handle large tonnages is available. We want to help you solve your metallurgical problems. Item 311.



Denver-Dillon Screens give fast, clean separation without blinding. You get an even, smooth flow of material because of the patented "true-circle" action. Two bearing construction gives up to 50% savings in power. This mill photo shows the even distribution of the oversize—no blinding. Item 313.



60'x12' Denver Spiral Rake Thickener handling Fluorspar middlings from cleaner flotation cells. Patented Denver Spiral Rakes tend to eliminate overload due to their rapid removal of settled solids. Underflow metered with Denver Adjustable Stroke Diaphragm Pump. Item No. 315.

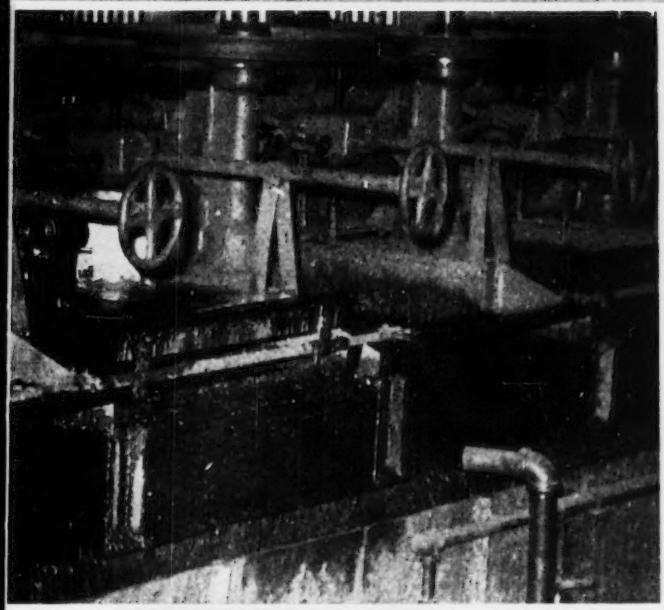


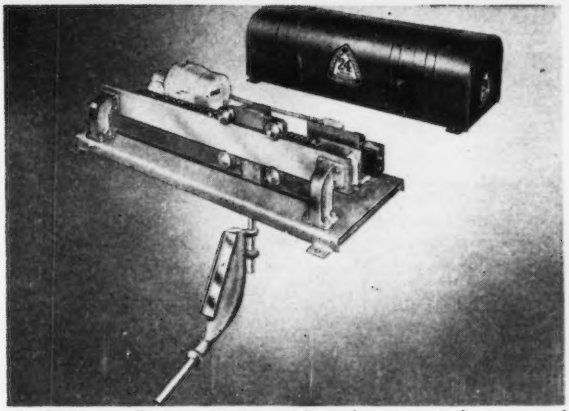
Denver "Sub-A" Laboratory Flotation Cells are used extensively by companies all ever the world to check mill operation and maintain careful mill control. If you need lab equipment DECO has a complete stock—or you are welcome to use the Denver Laboratory Service for batch or continuous tests, or other problems. Item No. 317.

*"The firm that makes its friends happier, healthier and wealthier"*

**DENVER EQUIPMENT CO.** 1400 17th St., Denver 17, Colorado

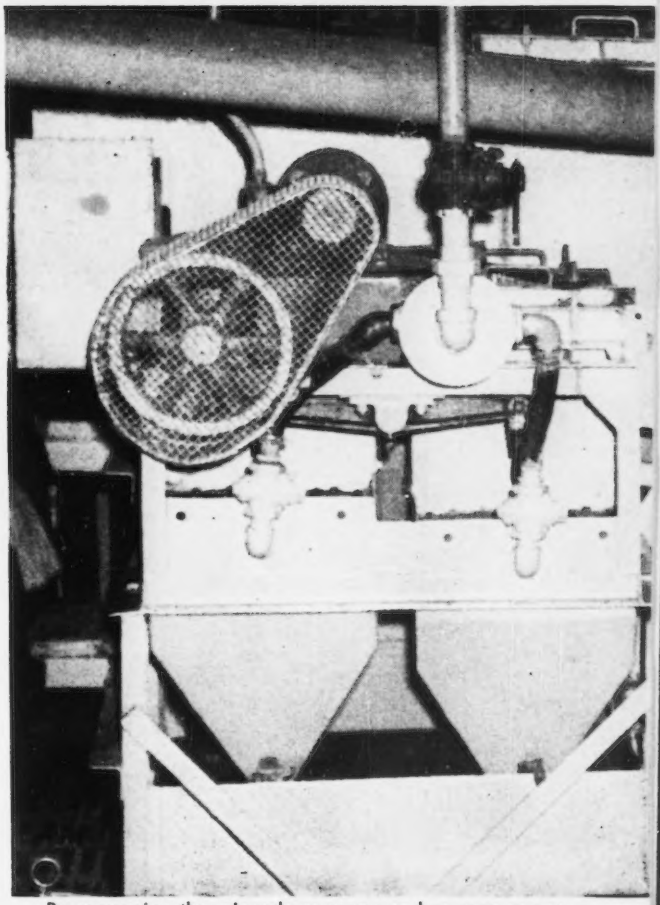
# IN THE NEWS . . .



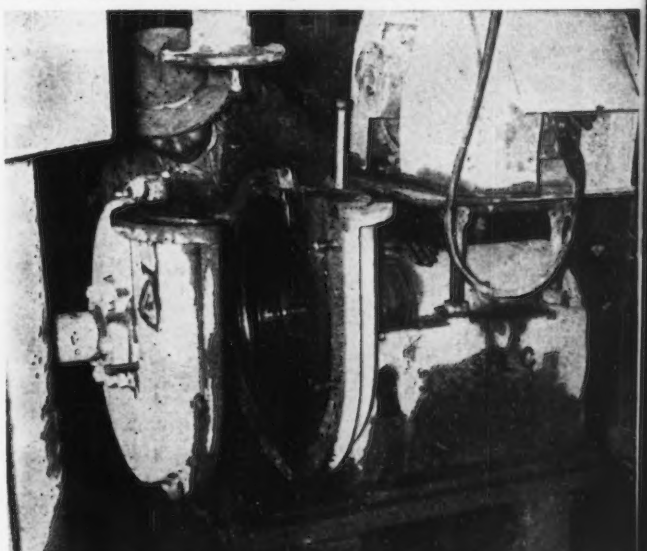


Cutter on Denver Automatic Sampler is carried on rugged ball bearing roller assembly, replacing old-style sliding contact. Rolling carriage allows the cutter to move through the stream of material to be sampled at a uniform speed. Frequency of sample cutting easily regulated. This gives accurate percentage samples, always. Item No. 316.

The 1955 Denver Wall Calendar and Mill Chart, and the 1955 Denver Annual Diary are being sent to everyone on our DECO Trefoil mailing list. If you would like to receive these two useful items, and DECO Trefoil, without cost to you, please send us your name immediately. Item No. 318. Sorry, but this offer can be extended only until Dec. 31, 1954.



By recovering the minerals as coarse and as soon as possible, Denver Selective Jigs avoid losses by over-grinding and sliming. Denver Jigs handle unclassified feed, make both fine and coarse concentrates. Up to 800 T/24 hrs. Item 314.



This Denver SRL Pump is mounted on a sliding base—making it easy to move pump back for quick inspection or parts replacement. Rubber - bonded - to - steel lining not only gives longer wearing part life, but also increases efficiency and lowers horsepower requirements. This 3"x3" Denver SRL Pump is used to pump cleaned zinc concentrates to cyanide circuit. Item No. 312.

**WRITE TODAY, FOR ADDITIONAL INFORMATION** . . . Please request additional information by the Item Number.

COLORADO SPRINGS, 500 South Sewatch Street, Phone MElrose 3-7158
DENVER 17, Box 5268, 1400 17th Street. Cable DECO, Phone CHerry 4-4466.
CHICAGO 1, Bell Building, CEntral 6-2422
NEW YORK, Empire State Bldg., Cable DECOYORK, Phone Chickering 4-6510.
EL PASO, 201 West 7th Street, Phone 3-8371
SALT LAKE CITY, P. O. Box 705, Phone 64-8012.
TORONTO, ONT., 220 Bay Street. Cable DECOTOR, Phone EMpire 3-8836.
VANCOUVER, B. C., Credit Foncier Building, Phone Marine 4918.
LONDON, EC2, 15-17 Christopher St., Finsbury Square, Cable DECOLON, Phone Bishopsgate 3575.
MEXICO, D.F., Avenida Juarez 14, Phone 21-1477.
JOHANNESBURG, Broadway & 9th, Bez Valley, Cable DECOJO, Ph. 25-7531

# "Be sure of your wire rope"

"WE'RE GETTING top performance from this type of rope. And it's the same with all the other ropes we use... Roebling makes a construction and size that's absolutely right for our requirements. When we buy Roebling we get exactly what we want, when and where we want it."

* * *

Roebling is one manufacturer who makes a complete line of wire rope for mining. And no matter where you are, there's a convenient Roebling branch or distributor to give good and fast service. Call your nearest Roebling office or distributor for a Field Man. He'll recommend the best rope for your equipment, and you'll get it on time and right.

**ROEBLING** CF&I

*Subsidiary of The Colorado Fuel and Iron Corporation*

**JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J.**

BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

# WATER AND RUBBER JOIN FORCES

## PREPARING SITE FOR 6,500,000-YARD DAM!

THEY TOOK A TIP FROM THE FORTY-NINERS at Cherry Valley Dam, now rising in California's Sierras — for much of the overburden clung to slopes too steep for equipment. So they washed it down into the valley with high-pressure water jets, which also were used to wash out fines (as shown above). Then crawlers and the following rubber-tired equipment took over—15 scrapers, 35 haulers, 3 water trucks, 3 compactors, 14 pickups, 2 grease trucks, 3 flat-bed trailers and a couple of tank trucks. The mountain goats would hardly know the old place now!

*BIG TIRE STOCK PILE ON JOB speeds changes for inspection and maintenance.*

**You find "Goodyear is there"** on more and more jobs where the going is rugged—and there's no time for down time. That's because Goodyears, always tough brutes, are now more enduring than ever—for they're made with Goodyear's new, exclusive, Triple-Tempered (3-T) cord!

**This patented 3-T process** keeps Nylon or Rayon cord at its most bruise-resistant, heat-resistant point. It controls tire growth, reduces tread and body failures to new LOWS—keeps tires in shape for *extra* re-lugs and recaps. Next time you buy or specify any type tire, remember *only* Goodyears have 3-T Cord! Goodyear, Truck Tire Dept., Akron 16, Ohio.

HARD ROCK LUG

HARD ROCK RIB

ALL-WEATHER

SURE-GRIP

*FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE!*

**GOODYEAR**

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

*And Remember*

**NOTHING ELSE CAN TAKE IT LIKE 3-T NYLON!**

(Sure-Grip, All-Weather —T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

# 7 important Dumptor advantages

Take another look at the latest model Koehring 6-yard Dumptor shown here. It has some important features worth checking. Notice how heavy snubber-spring on steering axle cushions road shocks — yet retains Dumptor's unique advantage of no spring maintenance. There are no leaf springs. Big shock-absorbing drive tires eliminate need for springs on the drive axle.

Alignment of drive wheels with steering wheels adds to efficiency of Dumptor no-turn shuttle hauling — makes a big difference in traction and flotation when Dumptor is shuttling back and forth across loose stockpiles, soft ground.

Another basic Dumptor advantage is instant gravity dump. It's controlled by a simple body latch and new dump lever arrangement. Gravity dumping eliminates slow-acting, troublesome body hoists — never balks, never wears out. Notice, too, the new streamlined, all-steel body. Even with all this heavy-duty strength, Dumptor still has more than 6 h.p. for every ton of loaded weight. It accelerates fast, pulls through soft ground and up grades with less shifting — climbs 24% grades fully loaded.

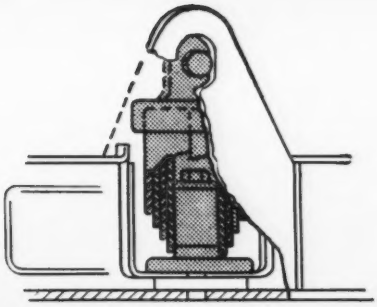
Let your Koehring Distributor give you all the latest Dumptor® facts. See him soon, or write.

**KOEHRING COMPANY**

MILWAUKEE 16, WISCONSIN

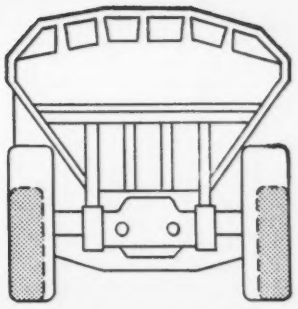
Subsidiaries: PARSONS KWIK-MIX • JOHNSON

K497



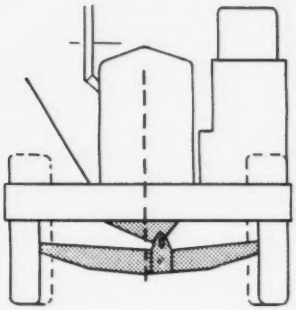
## Smooth ride

Heavy, snubber-type spring is mounted between Dumptor main frame and the steering axle. Shock-absorbing action provides plenty of "cushion" — takes all the jolts out of rough, off-road travel. Easy on operator and machine.



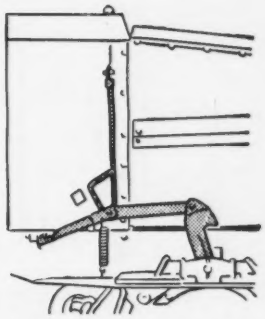
## Tires track in direct line

Wider, heavier steering axle puts Dumptor steering wheels in direct line with big drive wheels. Tires track in the same path. There's less rolling resistance, better traction in soft ground, and on rough haul roads.



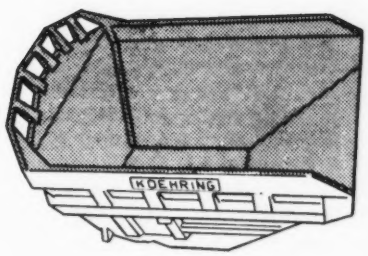
## Off-set pivot on axle

Pivot point on steering axle is off-set from center line 3¼" toward operator side of machine. There's no sag, even with unbalanced load. Steering axle oscillates up to 21" — keeps twisting strains out of Dumptor main frame.



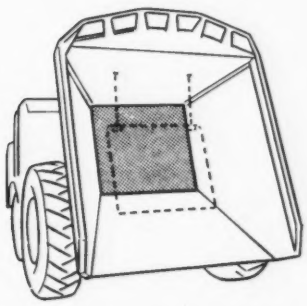
## New body-latch, dump lever

Body latch for 1-second gravity dumping is simple, trouble-free. Latch is engaged by a single hook, mounted on the chassis frame. Dump lever is located inside the cab, in an easy-reach position to left of operator.



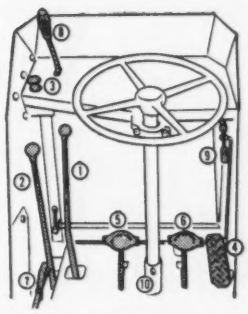

## Streamlined, all-steel body

Inside is free of bulges or ledges. Top edge is box-beam constructed. Sides, ends are ribbed with 5 and 8" channels. Double-plate bottom is lined with multiple steel beams. Note ridge bar added to sturdy rock-guard teeth.



## Bolted or free-swinging pan

Heavy steel kick-out pan is ½" thick. Pan can be bolted to body floor for extra protection when loading rock. Remove bolts, and pan has free swinging kick-out action — breaks suction when dumping wet or sticky materials.



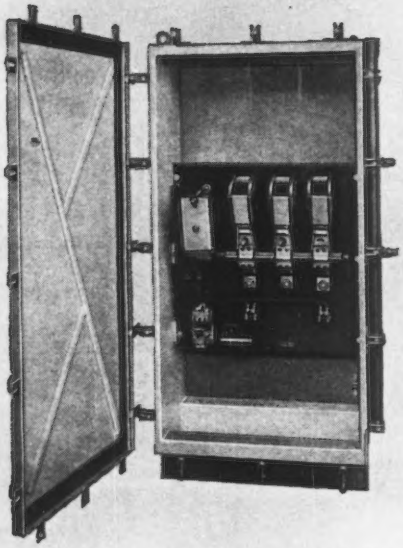
## Easy-reach controls:

(1) Speed gear shift lever, (2) directional gear shift lever, (3) starting aid, (4) foot throttle, (5) clutch pedal, (6) brake pedal, (7) parking brake, (8) body-release lever, (9) hand throttle, (10) running lights control switch.

# SPECIALIZED CONTROL for a ROUGH TOUGH JOB

ALLIS-CHALMERS

CONTROL



400-horsepower, 440-volt controller for squirrel-cage motor or primary of wound-rotor motor. Dust-tight enclosure.

## Custom-Engineered Protection for Motors Driving Crushers

PROTECTING A MOTOR driving an ore or rock crusher is a particularly complex control problem. In crushing, motor burdens (resulting from high inertias or extreme fluctuation of loads) dictate protection far beyond that provided by standard controllers. Only control engineered for your specific job can provide adequate protection.

An Allis-Chalmers control application starts with expert analysis of your problem by an A-C representative. Type of crusher, specific crushing conditions, and cost weighed against lost production are all factors in determining the kind and degree of protection he will specify. All recommendations are backed by complete research and testing facilities . . . by unsurpassed skill and experience in design, manufacture and application. For complete information, call your nearby A-C representative or write for Bulletin C53-424, Allis-Chalmers, Milwaukee 1, Wis.

A-4306

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Acetate Solvents, Crude
Acetate Solvents, Pure
Acetic Acid
Acetic Anhydride
Acetone
Acetylene, 15 psi
Air
Alcohols
Aluminum Ch
Aluminum P
Aluminum
Aluminu
Alums
Ammonia Gas
Ammonia Liquors
Ammonium Bisulfite (above 7.0 pH)
Ammonium Carbonate
Ammonium Chloride
Ammonium Hydroxide
Barium Cyanide
Barium Hydroxide
Bari

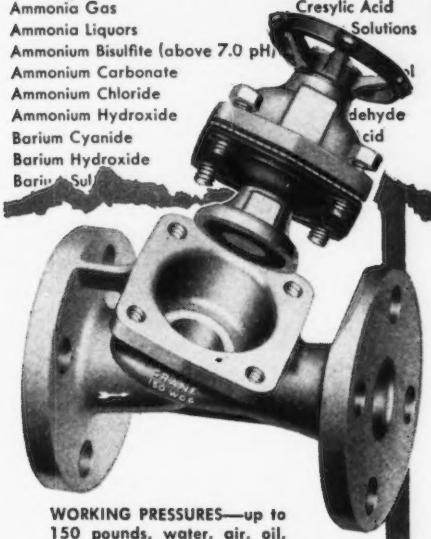
Carbon Dioxide, Dry
Carbon Dioxide, Wet
Carbonic Acid, Carbonated Beverages
Chromic Acid
Chromium Potassium Sulfate
Citric Acid
Coke Oven Gas
Creosote
Cresylic Acid

Hydrogen Gas
Hydrogen Peroxide
Hydrogen Sulfide
Iron Chloride (Ferric)
Iron Chloride (Ferrous)
Iron Potassium Sulfate (Ferric Alum)
Iron Sulfate (Ferric)
Magnesium Chloride
Magnesium Hydroxide
Magnesium Sulfate
Magnesium Sulfite
Mercuric Chloride
Oxalic Acid
Petroleum Oils, Refined
Phenol (Carbolic Acid)
Phosphoric Acid

Sulfuric Acid
Sulfurous Acid
Tartaric Acid
Tin Chloride (Stannic)
Tin Chloride (Stannous)
Sulfate (Stannic)
Sulfate (Stannous)
Water, Acid Mine Waters
Water, Boiler Feed
Water, Distilled, Laboratory Grade
Water, Distilled, Return Condensate
Water, Fresh, Industrial Supplies
Water, Saline, Sea Water, etc.
Zinc Chloride

# Name your poison

## or any hard-to-handle fluid



WORKING PRESSURES—up to 150 pounds, water, air, oil, or gas, 250°F. maximum temperature, depending on valve size, materials, and service.

## CRANE HAS THE BETTER VALVE FOR IT!

*Better* because they're safer, easier to operate. *Better* because they reduce maintenance to a negligible degree. And that holds true for just about any service, any fluid within rated pressure and temperature.

For Crane now offers the revolutionary diaphragm valve in a new wide choice of body, disc insert and diaphragm materials—in unlined or lined patterns. You specify whatever combination best suits your particular need. The regular line-up includes brass, cast iron, aluminum, or 18-8 SMo body and disc . . . with diaphragm and disc insert of Neoprene, Buna N, Kel -F, or natural rubber. Regular linings are Neoprene or hard natural rubber. Also sliding stem valves for automatic operators of all types. In addition, Crane Diaphragm Valves are regularly available for high-vacuum service, or oxygen and acetylene usage. Other body and disc materials, as well as linings, available on special order. Sizes from ½ to 6-inch.

### HOW CRANE DIAPHRAGM VALVES WORK

The Crane diaphragm serves one function only—sealing the bonnet. It is not subject to crushing and rapid wear. The seating member is a separate circular flat face disc, firmly attached to the stem and joined to the diaphragm with a special leak-proof connection. This independent seating feature permits positive shut-off with no loss of fluid, even in case of diaphragm failure.

### NEW LITERATURE . . . NEW FILM

Get complete, interesting facts about the expanded line of Crane Packless Diaphragm Valves in a new 24-page folder . . . and a new sound movie. You'll see how this revolutionary valve solves flow control problems where others fail. Check with your local Crane Representative, or use the coupon below.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Illinois

Gentlemen:

I would like to arrange for a free showing of the Crane Diaphragm Valve Film ( ).

I would like a copy of Diaphragm Valve Folder ( ).

Name.....

Company.....

Address.....

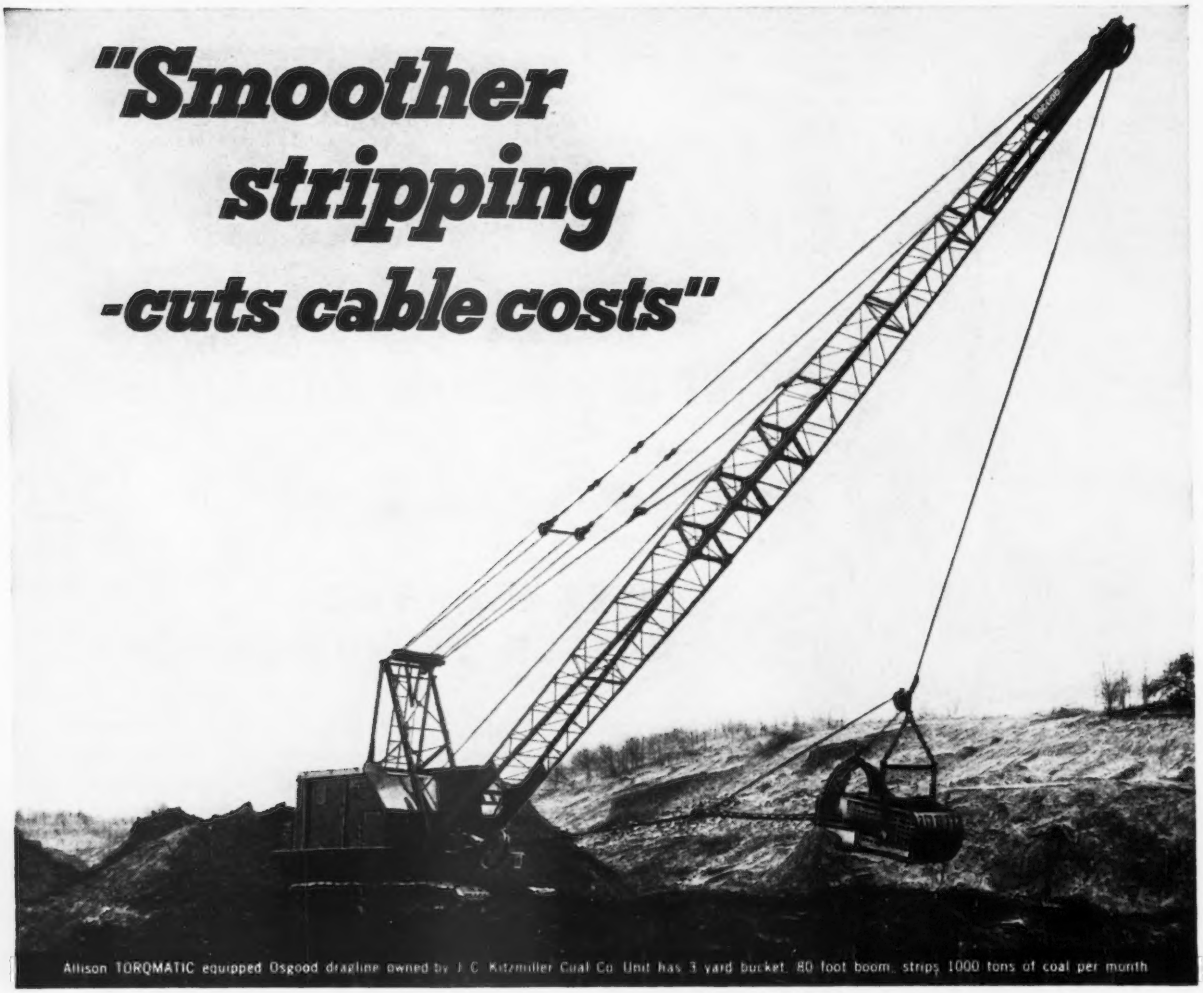
City.....Zone.....State.....

# CRANE CO.

General Offices: 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

**VALVES • FITTINGS • PIPE • PLUMBING • HEATING**

# "Smoother stripping -cuts cable costs"



Allison TORQMATIC equipped Osgood dragline owned by J. C. Kitzmiller Coal Co. Unit has 3 yard bucket, 80 foot boom, strips 1000 tons of coal per month

AFTER 2,000 hours of low-cost strip-mining, veteran mine owner J. C. Kitzmiller reports "smoother stripping — reduced cable cost" due to shock-free power transmission in his Osgood dragline. The savings he's made with his Allison TORQMATIC Converter have made him decide to specify Allison TORQMATIC DRIVES in future equipment.

He's spending less for cable replacement in his Osgood dragline because the TORQMATIC Converter protects cable by absorbing sudden shock loads.

He's spending less for dragline repairs, too. The TORQMATIC Converter gives the operator time to cut off power—"throw out the drag"—when the bucket hits a snag, guards boom and drive line from harmful overloads.

And he's getting more work from his drag because with fewer repairs it stays on the job *earning* money—out of the shop *costing* money.

The TORQMATIC Converter matches engine power to load demand, helps prevent harmful engine lugging and stalling. It multiplies engine torque up to 3½ times—broadens the engine's effective horsepower range.

When load demand is equal to, or less than, engine torque the Allison TORQMATIC Converter acts as a fluid coupling to conserve fuel, boost engine life. This feature is standard equipment in every Allison Converter.

You can produce more for less with shock-free TORQMATIC power transmission in your 40- to 400-horsepower gasoline or Diesel equipment. Ask your manufacturer or dealer about TORQMATIC DRIVES in your equipment or write for more information to: Allison Division of General Motors Box 894M, Indianapolis 6, Indiana

***ALLISON TORQMATIC CONVERTER***

**Simple Design** — one-piece cast converter elements — minimum maintenance

**Compact,** easy to install in existing equipment

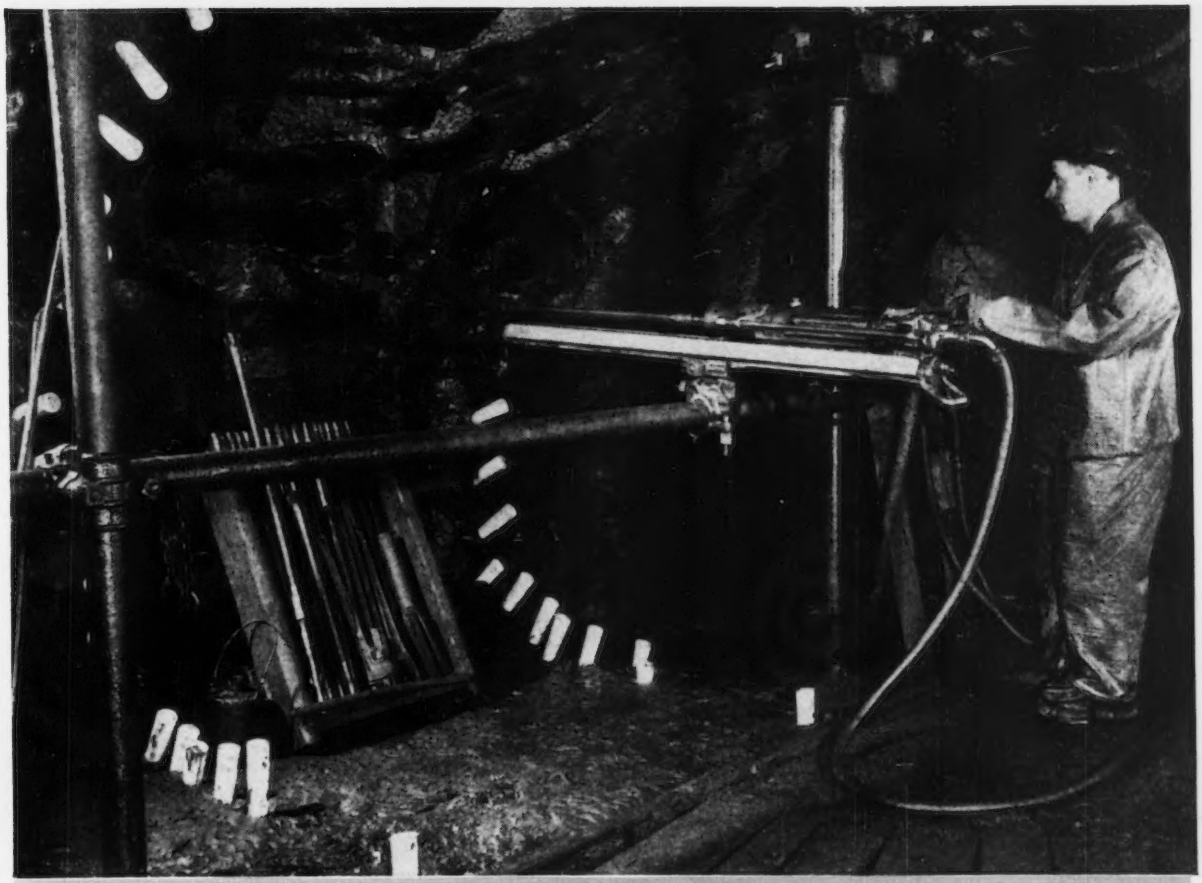
**Designed** for power applications in the 40 to 400 horsepower range

**Longer Equipment Life** — absorbs shock, eliminates harmful engine lugging, cuts maintenance costs

GM GENERAL MOTORS

***Allison* TORQMATIC DRIVES**

Compact, efficient hydraulic drives for Cranes * Trucks * Tractors * Scrapers * Shovels * Drilling and Servicing Rigs



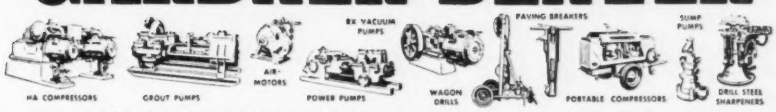
## What You Need in Drifters

# ...GARDNER-DENVER HAS!

When you choose Gardner-Denver Drifters, you pick the right combination for tackling any hard rock drilling problem.
The right cylinder bore—2¾", 3", 3½", 4" or 4½".
The right steel change from 2 to 20 ft.
The right feed and mounting—
Model CF or SF Screw Feeds
Model CM or RM Chain Feeds
Remote feed and drill controls if required.
Send for complete drifter specifications now.

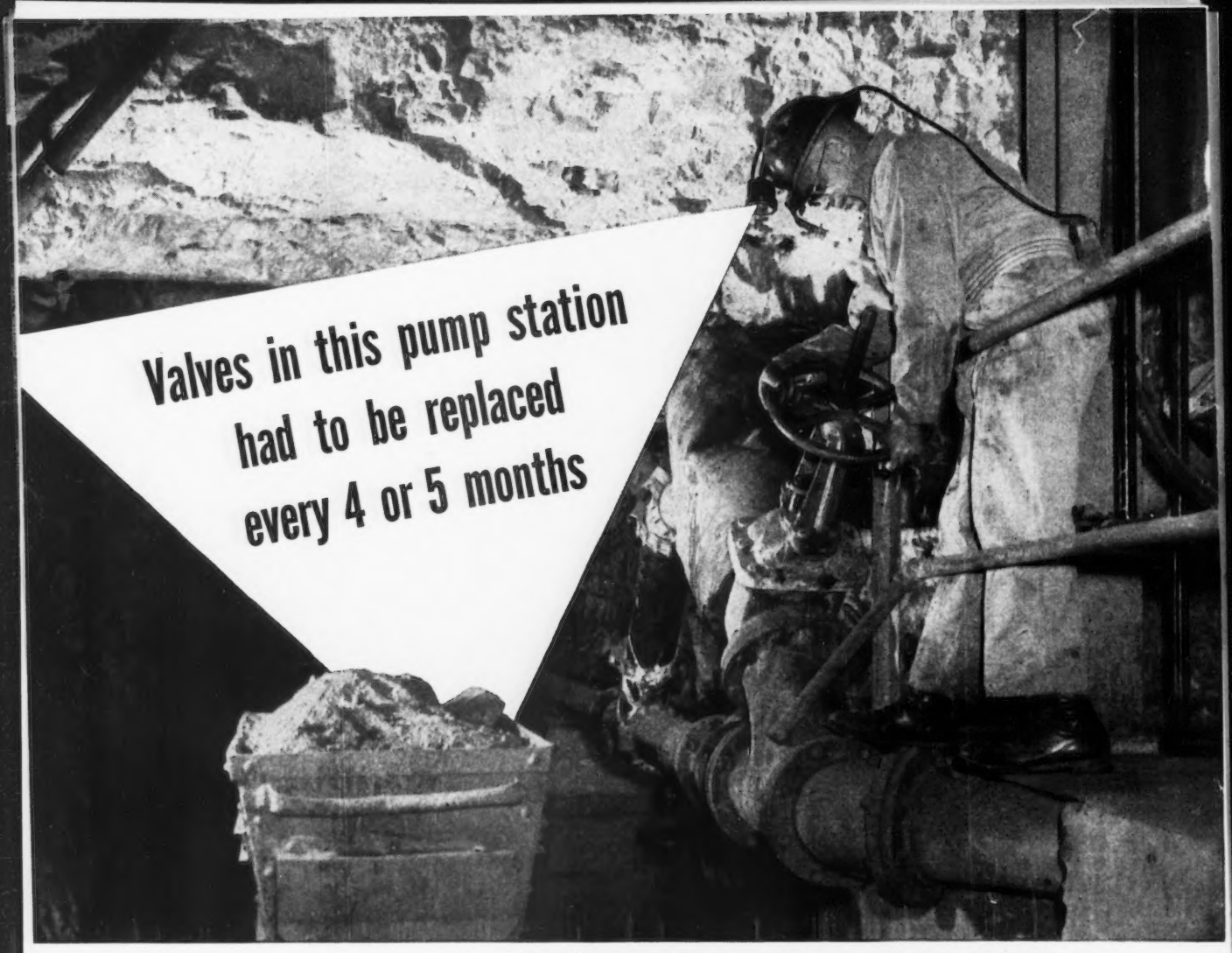
SINCE 1859

# GARDNER-DENVER




THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS
FOR CONSTRUCTION MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois • In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario




**PLANT CHIEF HAROLD STIENMIER** adjusts a Stainless Steel valve on eight-inch pipe carrying corrosive mineral waters deep inside the Gilman, Colo. mine of Empire Zinc Division.

# *until Stainless Steel took over the job*

HIGHLY mineralized and extremely corrosive water took its toll of mine pump valves at the Gilman, Colo. operation of Empire Zinc Division, The New Jersey Zinc Company, until Stainless Steel provided a lasting answer to the problem.

Harold Stienmier, plant chief at the Gilman operation, tells the story: "Mild steel brass-trimmed valves were having to be replaced every four or five months due to corrosion from the mine waters. We started replacing them with Stainless Steel valves and they are as good as the day we put them in."

"The day we put them in" was 1944 in some cases . . . making them 10 years old. So, even though Stainless valves cost three times as much as valves formerly used, they paid for themselves the first year and have given nine years of almost cost-free service since.

This is but one of many cases where Stainless Steel has proved beyond doubt that it is the most economical material you can use where corrosion and abrasion present a problem. It is a versatile material, able to handle all kinds of jobs and handle them well.

If you have spots in your equipment where premature failure is adding to your production costs, give Stainless Steel a trial. And when you do, be sure it is perfected, service-tested USS Stainless Steel.

★ ★ ★

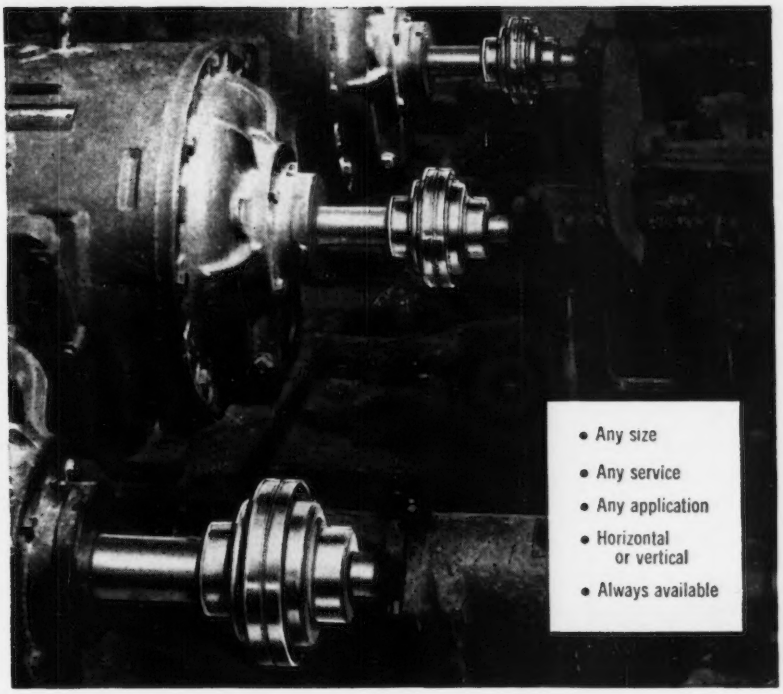
UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO · NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

## USS STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS — PIPE · TUBES · WIRE · SPECIAL SECTIONS

4-1465

UNITED STATES STEEL



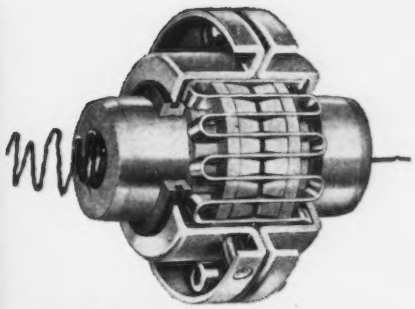

# FALK Steelflex Couplings save you money by prolonging the work-life of connected machinery

Ever since the first Falk Steelflex Coupling was designed and built, more than thirty years ago, we have firmly held to these beliefs:

1. A coupling, to give fullest value, must do more than merely connect driving and driven machinery—it must protect the machinery and prolong its life.
2. A coupling, to be truly flexible, must overcome the effects of shock and vibration, as well as shaft misalignment (see column at right).

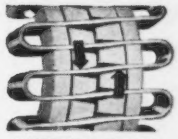
Proof of the soundness of these beliefs is furnished by the record. Many Falk Steelflex Couplings installed 10, 20, even 30 years ago are still giving trouble-free service—still providing maximum protection for the machinery they connect!

A single basic type—the world-famous Type F—fills nine out of ten industrial application needs. Versatile, efficient and economical, it is always quickly available, in a wide range of sizes, regardless of your location. Write to Department 247 for engineering bulletin, including selection and dimension details.



## How Torsional Resilience smothers shock and vibration

The steel gridmember connecting hubs fits snugly only at outer edges of tapered hub-teeth. As load increases, gridmember flexes against teeth in proportion to load, providing cushion that spreads peak loads over longer time increment and reduces stresses in machinery.


UNDER NORMAL LOAD

**...Accommodates shaft misalignment... Permits free end float**

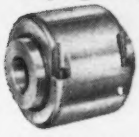
The exclusive FALK all-steel grid-groove design provides compensation for parallel and angular shaft misalignment . . . permits free end float.

ANGULAR MISALIGNMENT

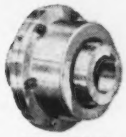
PARALLEL MISALIGNMENT

FREE END FLOAT

**Special or Dual Purpose FALK Steelflex Couplings for problem applications**

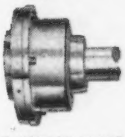

LIMITED SPACE
Type FS

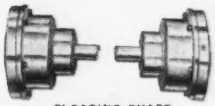
RAPID REVERSING SERVICE—Type CM


HIGH SPEEDS
Types H and HH

BRAKEWHEEL SERVICE
Type BW

OVERLOAD CONTROL
Type FT


EXTENDED SHAFT
Type P


FLOATING SHAFT
Type PP

**Do you have a coupling problem?**

If so, describe it in writing—we will gladly recommend the proper Steelflex coupling for your needs. Write to Department 247.

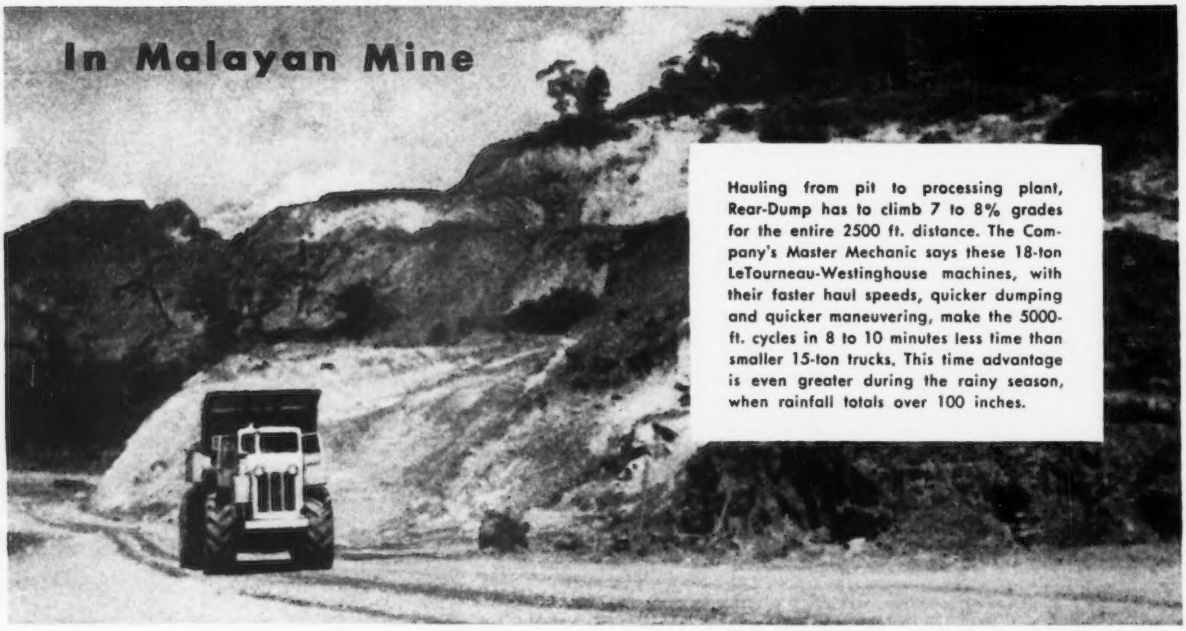
**THE FALK CORPORATION, Milwaukee 8, Wisconsin**

**MANUFACTURERS OF**

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

**FALK**

**...a good name in industry**


In Malayan Mine
Hauling from pit to processing plant, Rear-Dump has to climb 7 to 8% grades for the entire 2500 ft. distance. The Company's Master Mechanic says these 18-ton LeTourneau-Westinghouse machines, with their faster haul speeds, quicker dumping and quicker maneuvering, make the 5000-ft. cycles in 8 to 10 minutes less time than smaller 15-ton trucks. This time advantage is even greater during the rainy season, when rainfall totals over 100 inches.

# Two 18-ton Tournapull Rear-Dumps produce as much as four 15-ton trucks

Eastern Mining and Metals Co. produces over a million tons of high grade iron ore annually at their Dungun Mine on the East Coast of Malaya. Daily production includes 2,000 tons of washed ore. Formerly, all hauling from pit to 2 crushers, and from pit to washing plant, was handled by nine 15-ton trucks. Then, the firm purchased two 18-ton Tournapull Rear-Dumps. Their Mine Superintendent reports these results:

### Reduce haul time 50%

Working the same 2500-foot one-way hauls as the trucks, and climbing the same 7 to 8% grades, the Tournapull Rear-Dumps make the round trip *in only half the time* it takes the trucks. One reason is they dump faster! Rear-Dump bowl lifts instantly at the touch of an electric switch. There is no wait for hydraulic pressure to build up. A second reason for the faster cycle time is that Tournapulls spot more quickly at the shovel and at the crusher, and they turn in less space! These LeTourneau-Westinghouse units can turn around non-stop in a space only 21 ft. wide. Trucks need a space at least 61 ft. wide to complete the same non-stop 180° turn.

Rear-Dump gets capacity 18-ton load of iron ore in 4-5 passes of the 2½-yd. shovel. Low entry from rear, big bowl target, speed shovel swings, reduce spillage.

As a result of all these factors, each 18-ton Tournapull hauls as much iron ore as two of the 15-ton trucks.

### Tournatractor speeds cleanup

Eastern Mining also reports "highly satisfactory service" from their new Tournatractor (LeTourneau-Westinghouse's tractor on rubber tires). This 208 hp unit is being used for cleanup around the power shovels in the pit and for stripping overburden. Like the Tournapull, it is controlled electrically. Because of simplicity of operation, untrained laborers have become skilled operators in a few days.

### Find out more

Let us show you more about these dependable rubber-tired machines. We will gladly help you make production and cost estimates, or arrange to let you see these earthmovers in action.

Tournapull—Trademark Reg. U.S. Pat. Off.
Tournatractor—Trademark RT-678-M-bw

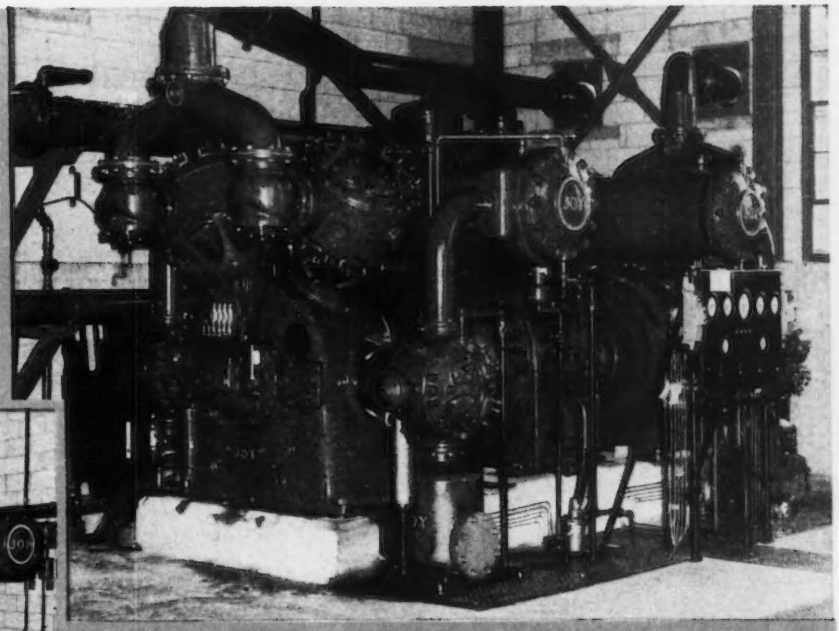
**LeTourneau-Westinghouse Company**

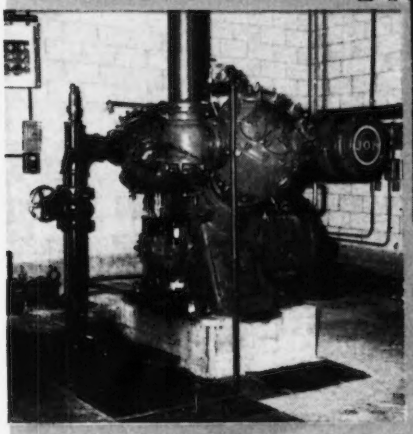
PEORIA, ILLINOIS

*A Subsidiary of Westinghouse Air Brake Company*

**WN-114**—Large metal mine installation, typical of Joy compressor installations at many modern large mines.

**WN-112**—Typical installation at an eastern lead-zinc mine, one of the many WN-112's in smaller mine service.





# JOY LOW MAINTENANCE AIR COMPRESSORS

## keep drills, slushers and mucking machines working

**HERE'S WHY:**

- Honed, field-replaceable crosshead and cylinder liners.
- Exclusive "Dual Cushion" Valves—large area, low lift.
- Factory assembly and testing to insure permanent alignment.
- One-piece, box-type tinned crossheads.
- Full force-feed lubrication.
- Precision crankpin and crosshead pin bearings.

The Joy WN-114 and WN-112 are heavy-duty, two-stage, double-acting package-type compressors with displacement capacities from 368 to 3896 CFM. Other stationary compressors are available with capacities as low as 1.2 CFM and pressures from 30 to 600 psi. Ask Joy for an air-power survey of your mine. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

*Consult a Joy Engineer*

**for AIR COMPRESSORS, ROCK DRILLS, HOISTS AND SLUSHERS**

JOY

W&D MS405

**WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT**

## Of Vital Interest to Preparation and Processing Men

**This new 20 page Heyl and Patterson Booklet** is crammed with information on the H & P Cyclone. It shows how the H & P Cyclones operate, provides flow diagrams and photographs from actual installations, and gives operating data from typical applications in the coal, mining and chemical processing industries.

*If you feel that you have a possible Cyclone application, contact the H & P Research Department. If our experienced engineers don't know the answers to your problem immediately, they have complete facilities and data to obtain these answers. You can be assured of their complete cooperation.*

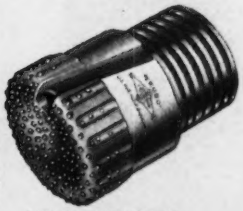
There are probably places in your plant where H & P Cyclones could be used to advantage to replace or supplement other more costly equipment. The obvious benefits of high efficiency, low cost and small amount of space used may open fields of application in which the Cyclone has never been tested.

The very nature of the H & P Cyclone makes it something that every processing man should know about. You will find this booklet worthy of your deep study. It belongs in your permanent file for future reference. Write today for Booklet CT-954.

Cyclone Thickeners
Thermal Dryers
( The Drying Dutchman )
( Reineveld Centrifugal Dryer )
Thorsten Coal Sampling Systems
Rotary Mine Car Dumpers
Coal Crushers
Coal Preparation Plants
Bradford Breakers

Heyl+Patterson, Inc.
"SINCE 1887"
55 FORT PITT BLVD. PITTSBURGH 22, PA.

TRUCO CORING BIT



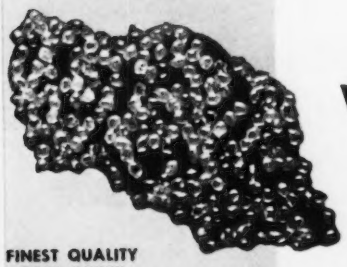
TRUCO CONCAVE BLAST HOLE BIT

TRUCO PILOT BIT

TRUCO IMPREGNATED CORING BIT

TRUCO REAMING SHELLS

TRUCO STANDARD OIL FIELD BIT



FINEST QUALITY DRILL BORTZ

# "Smash the Great Diamond, Before My Eyes!"

Vasilica was undoubtedly one of the most beautiful women in the whole world. Ali Pasha, Khedive of Egypt, was sure of it, and for such a treasure, what gift more fitting than this great diamond!

Treasured for centuries by Indian princes, it had been presented to Lord Piggott when he was Governor of Madras. When he died in 1770, it had been sold for $50,000 to a London pawnbroker who organized a lottery for the "Great Piggott Diamond" and saw it won by a poor clerk who quickly sold it and disappeared.

Recut to dazzling brilliance, it was presently offered to Ali Pasha who happily paid $150,000 for it and said, "Now, I have *two* great treasures—Vasilica and the great diamond."

But, Ali Pasha also had a deadly enemy, Raschid Pasha, who hated him and coveted his treasures and whose trained assassins awaited—and struck.

Realizing that his beloved treasures might now fall to his enemy, Ali gave one last command: "Smash the great diamond—before my eyes, and my dear wife, let her be strangled." But, while the slave was hammering the jewel to dust, Vasilica quietly slipped away and escaped.

Diamonds have played many such dramatic parts in the pageant of history but, today, one of their greatest roles is that of the vital cutting element in Truco Diamond Bits. Trucos have that irresistible cutting power which takes them through any formation swiftly, accurately, thriftily, dependably. They are used profitably in every phase of drilling. Have you the Truco Diamond Bit Catalog?

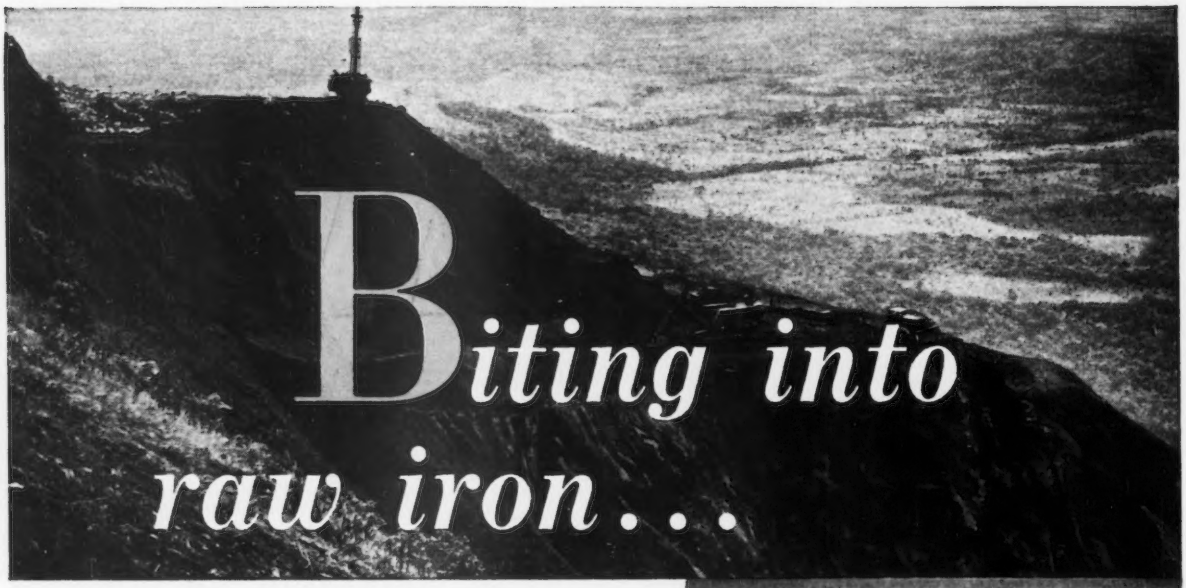
## TRUCO DIAMOND BITS

*by*

## WHEEL TRUEING TOOL COMPANY

**3200 W. Davison Avenue, Detroit 38, Michigan**

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue, Windsor, Ont., Canada



# Biting into raw iron...

Two years of tough, schedule-smashing construction by the men of Morrison-Knudsen Company made possible the first shipment of ore from Venezuela's Cerro Bolivar, for the United States Steel Corporation.

To reach the ore deposits, a 91-mile railroad and an 80-mile highway had to be constructed. A monthly average of 400,000 cubic yards of earth and rock was moved to prepare the railway grade alone. Part of the way, excavation was almost entirely in double-extra-hard granite, with a crushing strength of 60,000 psi. And on the southern slope of Cerro Bolivar itself, scores of side-hill cuts were made through hard layers of solid ore that graded 65% or more pure metal.

This was a job that demanded an exceptional combination of engineering skill, determination, and the best of construction and drilling equipment... that's why Crucible Hollow Drill Rods were chosen. For *lowest cost per foot of hole drilled* specify Crucible Hollow Drill Rods.

Crucible Hollow Drill Steel in machines like these bite into ore on Cerro Bolivar.

One of the men who helped make the project possible — C. Dugan Graham, vice-president of M-K de Venezuela, and project manager in charge of the job.

**CRUCIBLE** first name in special purpose steels

*54 years of Fine steelmaking*

**HOLLOW DRILL ROD**

**CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.**

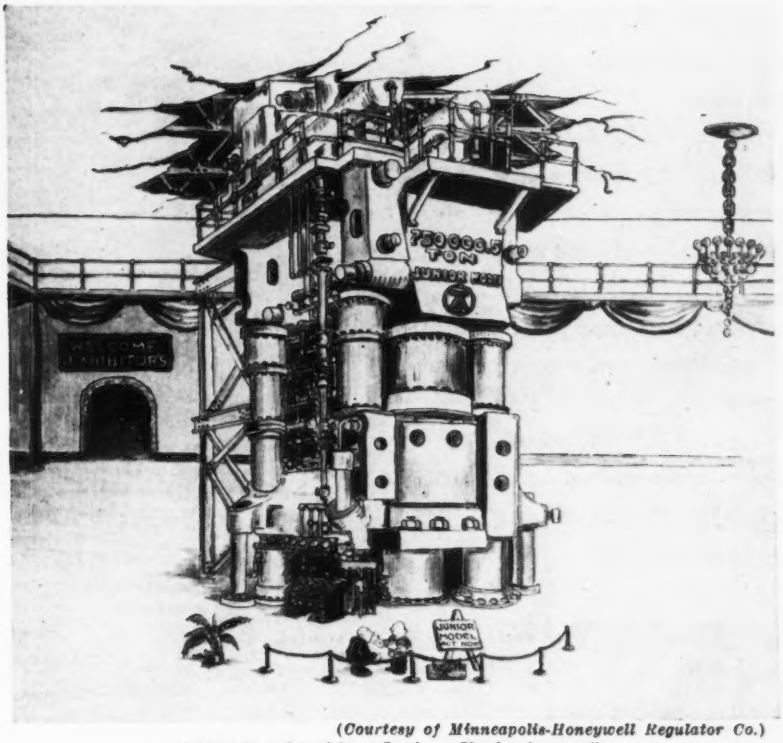
REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

E&MJ NEW PRODUCTS DIGEST

# New Products Review

THIS EQUIPMENT REVIEW is designed to bring you up to date on new products made available to the mining industry within the last two years. This year's Mining Show in San Francisco focussed attention on new equipment but just reviewing the equipment exhibited would leave many interesting developments uncovered. Therefore, to expand the usefulness of this review we have included major equipment developments of all the nation's leading manufacturers since the 1952 Mining Show in Denver. Because of space limitations we asked each manufacturer to tell us which one of his units he felt it was most important for you to know about. For each new product or new line of products, you will find a paragraph on the following pages telling you what is new about it and how it can help solve your production problems.

For convenience in finding your way through the review, the products are grouped under the headings found at the right. For information on products reviewed, use card opposite p. 42.

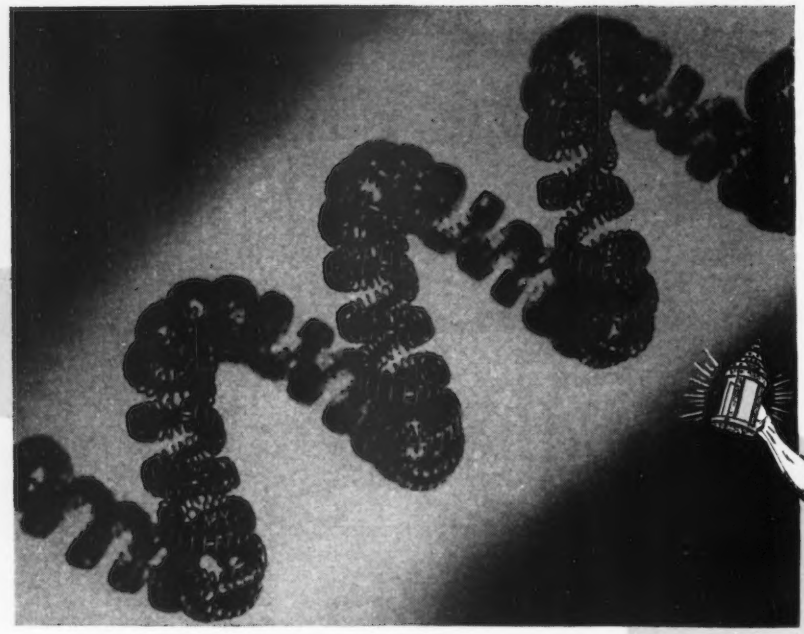



*(Courtesy of Minneapolis-Honeywell Regulator Co.)*

**"If I sell eight of 'em,** I win a Shetland pony."

**INDEX**


| | |
|---|---|
| **Batteries** | **36** |
| **Bins and Feeders** | **36** |
| **Blasting** | **36** |
| **Clamps** | **36** |
| **Classifiers** | **36** |
| **Communications** | **36** |
| **Concentration** | **36** |
| **Construction** | **36** |
| **Conveyors** | **36** |
| **Cranes and Shovels** | **36** |
| **Crushing and Grinding** | **39** |
| **Drilling** | **39** |
| **Dust Collection** | **39** |
| **Electrical Equipment** | **39** |
| **Filters** | **39** |
| **Furnaces** | **40** |
| **Geiger Counters** | **40** |
| **Ground Support** | **40** |
| **Hose and Pipe** | **40** |
| **Hydraulic Mining** | **40** |
| **Industrial Gun** | **40** |
| **Instrumentation** | **40** |
| **Loading** | **40** |
| **Lubrication** | **40** |
| **Magnetic Separators** | **40** |
| **Materials Handling** | **40** |
| **Power** | **40** |
| **Power Transmission** | **40** |
| **Protective Coating** | **42A** |
| **Pumps** | **42A** |
| **Reagents and Feeders** | **42A** |
| **Safety** | **42A** |
| **Screens** | **42A** |
| **Steel** | **42A** |
| **Surveying** | **42A** |
| **Track and Rail Equipment** | **42B** |
| **Tractors, Dozers, Loaders** | **42B** |
| **Trucks, Trailers** | **42B** |
| **Ventilation** | **42B** |
| **Washers** | **42B** |
| **Welding** | **42B** |
| **Wire Rope** | **42B** |



*Shown at the left is a view of the triple-coil tungsten wire used in many modern fluorescent lamps. (Photo courtesy General Electric Lamps)*

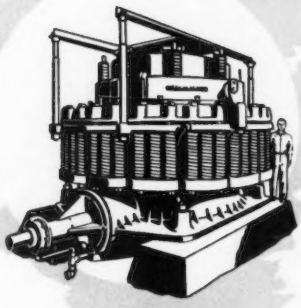
## *The "ARISTOCRAT OF RARE METALS" might have helped Diogenes . . .*

If *TUNGSTEN*, the *"aristocrat of rare metals"*, had been discovered in his time, the Greek Cynic, *Diogenes* might have been able to carry a much brighter lamp to aid in his search for an honest man. For among the many contributions of this metal to modern civilization is the tungsten filament which gives a quality of artificial light otherwise unattainable.

Due to low grade characteristics, and the hard abrasive rock in which tungsten ore is generally found, producers must attain desired particle size for maximum recovery as quickly and economically as possible. It is significant to note the use of SYMONS® Cone Crushers by many of the large tungsten producers . . . who find these crushers particularly suited to tungsten ore reduction because of maximum utilization of crushing surfaces against the highly abrasive material, with minimum wear.

Thus, in tungsten operations . . . *as in all of the great ore and industrial mineral operations the world over* . . . SYMONS Cone Crushers are relied upon to efficiently produce great quantities of finely crushed product at low cost.

**NORDBERG MFG. CO., Milwaukee, Wisconsin**



**SYMONS Cone Crushers...the machines that revolutionized crushing practice.. are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.**

**SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD.**

C153

NORDBERG MACHINERY

NORDBERG

CRUSHERS SYMONS SCREENS NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

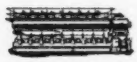
NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

**SYMONS PRIMARY CRUSHERS**

**GRINDING MILLS**

**MINE HOISTS**

**SYMONS VIBRATING BAR GRIZZLIES and SCREENS**



**DIESEL ENGINES**

# New Products Review—What's New About Them—How They Will Help You

## BATTERIES

**C&D Batteries, Inc.** New line of stationary batteries specifically for switchgear, control and auxiliary power applications comes in two complete lines, PlastiCell and PlastiCal, and represent a major and basic improvement in stationary battery design. 1

**C&D Batteries, Inc.** The fully-automatic Hobart battery charger, prepared especially for metal mining service. 2

**Thomas A. Edison, Inc.** MC-type storage battery is produced in 6 cell sizes from 285 amp-hr to 710 amp-hr. Supplies more capacity per unit weight than any previous Edison nickel-iron-alkaline battery. 3

**Ultra-Violet Products, Inc.** New 9-watt SL 6-v battery adapter for Mineralights gives long life in sustained operation. Adapts 6-v Hot Shot, wet cell or car battery. 4

**Gould-National Batteries, Inc.** If you're interested in longer battery life, better performance, send for "Plus Performance Plan." 5

**Exide Industrial Div., Electric Storage Battery Co.** Lower operating costs from use of Exide-Ironclad battery for mine locomotive service. 6

## BINS AND FEEDERS

**Cleveland Vibrator Co.'s** type RC vibrator comes in complete size range, capable of promoting flow of granular through discharge openings from one to several hundred tons. Absolutely silent in operation; longer, more troublefree life due to vibrator with rotary principle; deep, penetrating vibration. 7

**Omega Machine Co.,** division of B-I-F Industries, Inc. Model 50 Volumetric disc feeder can store up to 2 cu ft of bagged dry material, feed from few cu in to 1 cu ft per hour. Improved flat disc feeding mechanism has vernier gate adjustable to 0.001 in. Low operating and maintenance cost, uniform feeding, continuous and easily adjusted. Model GLW-O loss in weight feeder gives accuracy within 1% of present feed rate. Wide feed range set by single dial. Capacity ranges from 0.25 to 100 lb per hr. Simple and dustless. 8

## BLASTING

**Ensign-Bickford Co.** "Ignitacord" was introduced in October *E&MJ*; permits safe lighting of fuses after miner has left the face. Also new is Quarrycord, with which you can use safety fuse and caps in multiple block-hole secondary blasting, with the added feature of remote firing. 9

**Chester Cable Corp.** Abrasion-resistant nylon covering over insulated wire gives protection, reduces misfiring. Strength and protection allows re-use of wire, lower costs for blasting. 10

**Const Manufacturing & Supply Co.** Spittercord permits consecutive lighting of all safety fuses in a round from one point of ignition. Predetermined lighting interval between holes can be worked out easily. Safe, improved operating results. 11

**Atlas Powder Co.** Shotmaster blasting machine is generator-type condenser discharge. Brand new and designed for today's needs. 12

**E.I. duPont de Nemours & Co. Inc.** Blasting agents for open pit mining. MS delay electric blasting caps, CD blasting machines and safe, efficient, "Ignitacord." 13

**Hercules Powder Co.** Titan blaster, condenser discharge-type machine. New and specially designed for new demands in blasting. 14

## CLASSIFIERS

**Denver Equipment Co.** Revolutionary Denver-Finney submerged belt classifier gives quiet pool area at any mesh separation, "stop-and-go" ability under full load, reduced maintenance, lower hp requirements and is easily modified for corrosion resistance. 15

**Sturtevant Mill Co.** Superfine Whirlwind centrifugal selector has a variable speed controlled fan permitting a greater range and better control of air volume and closer selectivity of particle sizes. Will separate materials in micron ranges. 16

**Humphreys Investment Co., Engineering Div.** The Humphreys Spiral, with low cost, small space requirements, trouble-free performance, continues to make new and lasting friends. 17

**Hardinge Co., Inc.** Gyrotor air classifier. New principle of rotating vanes system of conical shape permits closer control and finer product. 18

**Heyl & Patterson Inc.** Reineveld Centripiane, 1750 rpm, is the first vertical basket centrifuge designed specifically for recovering minus 28 m slurries. Will increase recovery, clarify water circuits, save water and reduce sludge pond. 19

**Dorr Co.** Unusual flexibility in size of unit and arrangement of pockets marks new DorrCo jet sizer. Water distribution through horizontal pipes in each pocket eliminates constriction plate construction, simplifies maintenance. 20

**Equipment Engineers Inc.** A full range of Krebs cyclones for diversified classification use molded pure gum replaceable parts and integral two-stage units operated by a single pump. Give sharper sizings, higher hp utility, lower psi and cost of maintenance. 21

**Dorr Co.'s** TM DorrClones (either twenty-five 15 mm wet cyclones or thirty-two 10 mm units) are installed in a common housing to operate in parallel from a common feed. Make separations in the 2- to 20-micron range. Operation and control are simple and costs are lower. Single TM can handle up to 30 gpm of feed slurry. Within a few months, Dorr will offer multiple 30 and 50 mm DorrClones to cover particle size range between the TM and larger 3-in units. 22

**Oliver United Filters, Inc.** 10-in. Centriclone, a leader in its field, designed to handle specific, and tough problems. 212

## CLAMPS

**Thomas Laughlin Co.** announces first major binder development in years. Drop forged load binder won't spread and will take several chain sizes, jaw spreading is eliminated, handle can't loosen. Clevis hooks can be changed to handle six chain sizes with two binder sizes. Double clevis link does away with blacksmith and welder in connecting chain to rings, and links, shackles, eyes, etc. 23

**Band-It Co.** Clamps, for hose, cable, pipe, beams; ½- to 30-in dia; stainless steel and high carbon steel for high pressure uses. 24

**Ohio Brass Co.** Fittings for overhead trolley wire, aluminum and copper feeder cable fittings, rail bonds and collectors for locomotives, fused taps and rail clamps. 25

## COMMUNICATIONS

**Diamond Power Specialty Corp.** "Utiliscope" provides remote vision to industry, centralizes control, reduces accidents, costs, capital investment. Coming up is new "Utilivue" series 400 camera, distributed by Graybar Electric Co., Inc. 26

**Mine Safety Appliances Co.** Minephone, the proved communication that speaks for itself, speeds production, improves safety. Application in hundreds of locations underground and in pits. Hoistphone handles all spots where you can't use the compact, strong Minephone. 27

## CONCENTRATION

**Deister Machine Co.** Anti-friction headmotion for Deister Flat-O concentrating table. Latest revision of coordination of internal headmotion parts has produced a differential action of greater driving power, resulting quicker stratification and separation of mineral and gangue and faster travel for each. 28

**Yuba Mfg. Co.** Two-cell M-8 mineral jig gives constant, reliable performance, top performance and best product. 29

## CONSTRUCTION

**Unistrut Products Co.'s** all purpose metal framing products are constantly being improved and expanded. The bolted constructive system can be put together easily, is adjustable and reusable. 30

## CONVEYORS AND ATTACHMENTS

**Radio Corporation of America,** Engineering Products Div. Metal detector for any conventional conveyor belt, detects ferrous and non-ferrous tramp metal. Cuts equipment damage (and downtime), lowers production costs. 31

**Goodyear Tire & Rubber Co.** is building the world's strongest conveyor belt (120,000 lb working tension) to haul low-grade iron ore 1000 ft on a line while lifting it 280 ft. It will be installed in northern Minnesota. 32

**Stephens-Adamson Mfg. Co.** "Natural Frequency" trough conveyors for handling bulk materials horizontally or up inclines up to 10 deg at speeds up to 70 fpm. Also, car loaders and unloaders, ship trimmers, and conveying equipment in general. 33

**Merrick Scale Mfg. Co.** Weightometers to suit any width conveyor are now available with suitable instrumentation to control other processing equipment to make your plant operations more automatic. 34

**B. F. Goodrich Rubber Co.** Riffle Grip conveyor offers molded cover design which has a tread forming a series of angular steps with risers facing direction of belt travel. In handling wet material, prevents water from flowing to center of belt, drains off much of water content before material is discharged. 35

**J. D. Christian - Engineers.** Screw, bucket, rotor, belt types. "Consult Christian for Conveyors" and increase your output. 36

**Conveyor Co.** Integrators, mechanical and electronic; latter with two steerable wheels with a differential mounted on a flat disc which is driven by the return belt. Amazingly adaptable, efficient. 37

**Barber-Greene Co.** Packaged conveyor systems can cut your installation costs, save inventory expenses. Catalog 76-A gives basic information on conveyors installation for any service. 38

**Link-Belt Co.** Latest thing is a 60-in. wide conveyor belt; handles iron ore at up to 100 tpm. 39

**U. S. Rubber Co.** New Super Ustex-Nylon conveyor belt is a high strength belt for high tension work and is not affected by corrosion. Permits longer centers and higher tonnages. 40

**United States Rubber Co.** Belts for long-range, heavy duty work. Sturdy, low-maintenance operation, efficient carrying. 41

**Jeffrey Mfg. Co.** Conveyor for underground work features pneumatic take-up instead of gravity take-up requiring additional excavation. Replaceable disc shock absorbers take 5 times as much impact before rupture as previous belts. 213

## CRANES AND SHOVELS

**Austin-Western Co.** Hydraulic mobile crane for hundreds of uses indoors or out. With extensions, extensible boom has maximum horizontal reach of 35 ft. Cab is enclosed, outriggers are hydraulic-controlled, has road speeds up to 20 mph, can lift up to 5 tons. 42

**Clark Equipment Co.,** Construction Machinery Div. Michigan series "24" ¾-yd excavator crane has new, modern cab for top efficiency, air controlled power clutches, air operated swing brake, power handled removable counterweights. T-24 truck chassis is heavy duty, big engine, transmission and axles. C-24 crawler base is one-piece cast steel carbody and circle gear. 24-in tracks are standard. 43

**Thew-Lorain Shovel Co.** 45-ton crawler crane, companion to the famous Moto-Crane has diesel powered turntable with hydraulic coupling power takeoff on extra-wide crawler. TL-10 crane is a complete superstructure, equipped as lifting crane, can be used at ⅜-yd dragline or clamshell. Can mount on truck, pier, barge trailer, flat car. New Moto-Cranes MC254W and MC-424, with lifting capacities of 17½ and 22½ tons. MC524 and SP524, both 30-ton capacity, and the low-priced MC104, 6-ton. Scoop shovel consists of front end attachment, equipped with 1¼-yd dipper, which is attached to double dipper stick, can load on downgrade, level, or upgrade. 44

**Page Engineering Co.** Model 726, 12 to 20 cu yd capacity walking dragline on 125 to 185-ft boom. New Horizontal-Vee diesel engine has excess power to prevent overloading, speeds operations,

# It takes Six Bolts -

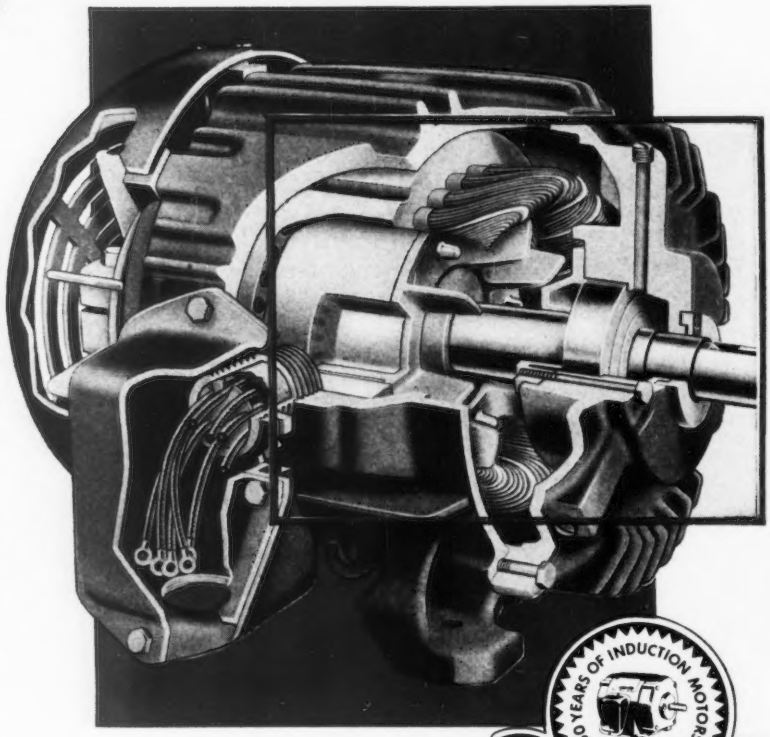
## not just four

## to give full bearing protection for greater motor performance

THE TWO EXTRA BOLTS in the end housing of every Allis-Chalmers ball bearing motor are the proof of *extra* protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Result? Allis-Chalmers motors pay off in longer, trouble-free bearing life, lower motor maintenance.



50 YEARS OF INDUCTION MOTORS
ALLIS-CHALMERS-NORWOOD WKS.

**Get all the facts . . . judge for yourself** — Compare Allis-Chalmers motors with other motors. Get the six-bolt construction that gives you complete bearing protection. For proof, see your Allis-Chalmers Office or Authorized Distributor, or write — Allis-Chalmers, Milwaukee 1, Wisconsin.

# ALLIS-CHALMERS

A-C ALLIS CHALMERS

A-4444

can be maintained with unskilled mechanics and minimum of shop equipment and special tools. 45

**Link-Belt Speeder Corp.** Draglines, 1¾ yd; shovel-cranes with ½- to 3-yd and 6- to 60-ton capacities, move earth when and where you need it. 46

**Marion Power Shovel Co.** Models 4161, 151-M, and 191-M shovels with dipper capacities from 6 to 10 cu yd, or 3½ to 8 cu yd dragline bucket capacities. All machines are electric. 47

**Harnischfeger Corp.** Electronic Stepless Control give P&H shovels and cranes smoother operation with less wear and tear on parts. 48

**Electric Steel Foundry Co.'s** ESCO two-piece renewable dipper teeth can save you money, maintenance time and manpower. 49

**Link-Belt Speeder Corp.** Speed-O-Matic power hydraulic control system for shovel cranes covers complete operation from operator's control to actuation of clutches and brakes. 50

**Industrial Brownhoist Corp.** Locomotive crane equipped with dual engine diesel-electric drive in 30 to 80-ton capacities. Unusually high tractive effort for heavy car shifting and working on extreme grades. Eliminates cost of extra locomotives for moving cranes. 51

**Osgood-General.** Pear-shaped dropball weighing 6000 lb, eliminates secondary blasting. Saved $1.17 per boulder at one mine. 52

**Baldwin-Lima-Hamilton Corp.** Lima type-2400 shovel (4 to 6 cu yd), crane (110 tons), or dragline increases yardage and tonnage 10 to 15% with smoothness, power and speed made possible with it's torque converter. 216

## CRUSHING AND GRINDING

**Kennedy-Van Saun Eng. & Mfg. Co.** Model 3648 "Cuber Senior" impact breaker, handling up to 350 tph of minus 3 in; up to 275 tph of minus 2 in with 150 to 250 hp required. Dual rotor, up-running impact breaker featuring multi-stage, triple action reduction. Large chamber allows breaking without restricting rock flow or jamming. 53

**Nordberg Mfg. Co.** Gyradisc (54-in size) alternately impacts and releases a thick mass of material through its gyrating motion. Produces large tonnages of fines with easy product size adjustment. Pneumatic release protects against overload and tramp iron. Can be started up in few minutes without cleaning crushing cavity. 54

**Bico, Inc.** Chipmunk crusher and UA pulverizers may fit just the spot that is your bottleneck. 55

**Traylor Engineering and Mfg. Co.** Gyratory crushers, converters, ball mills, roll crushers, jaw crushers. 56

**Smith Engineering Works.** Style S standard gyrasphere crusher features larger better located roller thrust bearings, heavier shaft and frame, better lubrication and easier access to inside working parts. In intermediate and fine crushing, these improvements will bring you lower crushing costs and an excellent product. 57

**Straub Manufacturing Co., Inc.** Kue-Ken jaw crusher, 30-in by 9-in. 30-12; and 36x48; gyratory crusher, 28-in. Special heavy-duty construction for crushing ferrosilicon and ferrovanadium, feature Kue-Ken oil bath lubrication system and overload release mechanism; special hydraulic release for material jammed in the jaws. Complete and broader range of sizes gives you full freedom to pick the right machine for the job. 208

**Iowa Mfg. Co.** Cedarapids double impeller impact breaker uses the principle of rock crushing rock for lower crushing costs and greater capacity. 215

## DRILLING

**Hossfeld Mfg. Co.** offers an easily transported, economically-powered drill with prospecting attachment for assay recovery at any depth with little loss of water, cuttings or salting. Hossfeld churn principle gets through difficult materials. Maximum recommended depth 110 ft. 58

**Salem Tool Co.** is expanding auger drill line to include air drill equipment using tricone heads; for blastholes, exploration. Experiments with underground augers and rotaries, if acceptable, will introduce complete line to hard rock field. 198

**Seismograph Service Corp.** Hole depths 200 to 300 ft are available with new A-3 portable rotary drill, used for years in jungle areas all over the world. Weight has been reduced, efficiency improved. 59

**Christensen Diamond Products Co.** Series C-2 NX size core barrel. Nominal hole size 2.98. Core size 1.87, 20 ft long, 10 and 5 ft, sell at $185, $160 and $150. Christensen has parts for entire assembly and, of course, top-grade bits. 60

**Joy Mfg. Co.** Silver Streak drills feature the dual-valve which admits the correct amount of air behind the piston, excludes air ahead of it so that full force of blow is exerted on the drill steel. 61

**Homelite Corp.** This company, makers of chain saws, offers a self-powered rock drill, operating on high-cycle electric current. The whole set-up for a jackhammer and generator weighs 230 lb. 62

**Acker Drill Co., Inc.** model AP digger has completely new, all hydraulic feed and control system. First medium-sized, low-priced earth auger on the market. 63

**George E. Failing Co.** A new, very fast drilling rig, the CBH Holemaster "has shown as much as double the time of previous drills in a given ground." 64

**Thor Power Tool Co.** Double boom jumbo, rail mounted. Dismantles easily to 4 units for lowering through shaft. Hose running through jib arms, enclosed elevating screws and other features offer lower maintenance costs. Air operated roof jacket automatically takes up slippage for rock chipping at point of contact. 65

**Acker Drill Co., Inc.** announces first line of power-operated equipment specifically for soil sampling. Light weight, mobile and rock drill can be attached. 66

**Stockdale Mine Supply.** "Beaver" core barrel, for high speed, low cost air drilling, long life and easy adaptability. 67

**Chicago Pneumatic Tool Co.** CP No. 55 diamond core and blasthole drill features high capacity, self-aligning rod puller, delicate bit control. For non-coring; special high bit speeds, adaptable to rod attachment. 68

**Davey Compressor Co.** Model M-8A, heavy duty drill for shotholes, blastholes, core drilling, well drilling. "Air-blast" drilling gives greater speed, better economy, no water needed. Brand new is the line of Davey air tools. Rock drills come in sizes from 28 to 58 lb. 69

**Boyles Bros. Drilling Co. Ltd.** BBS-1 surface diamond drill is notable for its folding mast for better operation, smoother production. 70

**Brunner & Lay, Inc.** Cost-saving Intra-Set, carbide inserted drill steel, is available in gage 1⅛ through 2⅛-in. Brunner & Lay's complete line of Rok-Bits finds application throughout the industry. 71

**Le Roi Co. Cleveland Rock Drill Div.** Westinghouse Air Brake Co. H10-AL air-leg; AL-90 single extension and telescopic drill; H12, a 55-lb hand-held drill; 90-lb stoper drill, model S12. 72

**Crucible Steel Co. of America.** Hollow drill rods, Trentweld stainless steel, Rexweld hard surfacing rods, Max-el machinery steel, Hy-Tuf nickel alloy steel bits reduce wear, cut downtime. 73

**Western Rock Bit Mfg. Co.** Liddicoat bits have applications in all drilling, are disposed of after use. McGee-Hogan grinder prepares drill steel for Liddicoat bit easily and efficiently. 74

**Varel Mfg. Co.** Rotary, cone-type rock bits, with dia from 2⅜ to 12¼-in. 75

**Vascoloy-Ramet Corp.** Deep hole drilling with tungsten carbide tools, made by Vascoloy-Ramet, have "doubled production" for one major mining company. Rates of penetration will surprise you. And V-R's men will show you how to grind tools for extra long life. 76

**E. J. Longyear Co.** Wire line core barrel gains in application. New on the scene is diamond core drill for exploratory core drilling (AX) to depths of 4000 ft. 77

**Reich Bros. Mfg. Co.** Model 600H, heavy-duty blasthole drill, is truck mounted for portability. Uses compressed air to remove cuttings. 78

**Timken Roller Bearing Co.** Rock bits, carbide-insert and multi-use, in all ranges and types for every major use in mining. Engineered for long, hard, use; built to give the best possible service for the most economical outlay. 79

**Gardner-Denver Co.** Drills and auxiliary equipment for deep-hole percussion drilling underground and from the surface mean lower cost per foot of hole drilled and possible reductions in breaking costs plus advantages of modern long hole drilling techniques in mining. 80

**Mayhew Supply Co., Inc.** Hurricane rotary air drill eliminates need for water trucks or shut downs for freezing conditions. Manufacturer also claims 20% faster penetration rate; 15% longer bit life in 4¼ to 7⅞-in. holes. 81

**Ingersoll-Rand.** Hydra Boom offers larger piston arm cylinders for lower oil pressure and longer packing life; double acting hydraulic cylinders permitting mounting under deck or top side because boom doesn't work by gravity; lower height for more headroom; extra long piston arms. 214

## DUST COLLECTION

**Western Precipitation Corp.** Dualaire dust collector in five sizes, unlimited capacity. New principle of cleaning filter elements eliminates shutdown of compartments. Pressure drop remains constant. Less space requirements, lower maintenance and replacement costs. 82

**American Wheelabrator & Equipment Corp.** No. 5 model 112 Dustube is impressive in its greater efficiency, wider range of application. 83

**American Air Filter Co. Inc.** AMERjet, the efficient fabric dust arrester, has been redesigned and has even greater applications. Dust collection with American's new unit is easily adapted to handle the most unusual and difficult conditions at your installation. 84

## ELECTRICAL EQUIPMENT

**Hazard Insulated Wire Works.** Ground conductor in new model cable has circular cross section. Increased flexibility over old flat ground model has given up to 400% better performance in tests. 85

**Ensign Electric & Mfg. Co.** Cable reel for mobile mine equipment in 100 and 250 amp capacities. Built for ac and dc with ground carried through collector ring. Built vertical and horizontal with interchangeable parts. Can be applied to some equipment now in use without reels—conserve stock of spare parts. 86

**Flexible Steel Lacing Co.** at the show, emphasized the REMA self-vulcanizing rubber repair material for conveyor belt and cable. Backed by Flexible because they feel it will help you, it offers a complete repair kit for $127.65. HD fasteners and hinged Flexco fasteners come in a range of applications. Impact tools and Alligator V-belt drives are finding new applications in small mines. 87

**Westinghouse Electric Co.** New lines of efficient, low-cost motors, gear motors, control centers, special slusher hoist motor. 88

**Anaconda Wire & Cable Co.** Mine cable, shuttle car cable and shielded and non-shielded cable show only part of Anaconda's many products for industry. Applications constantly grow with the products of this industry pace-setter. 89

**General Cable Corp.** Mineral-insulated cable (type MI) takes rough usage, stands up in heavy-duty applications. 90

**Simplex Wire and Cable Co.** Selenium neoprene armored and "cured in lead," this cable wears longer, gives greater safety, efficiency. Marked clearly for proper application. 91

## FILTERS

**Dorr Co.** Separation of phosphoric acid from waste gypsum was specific purpose of Dorr-Oliver traveling pan filter. They are vacuum filters, traveling pan or endless belt type, maintain filter medium at peak efficiency without shutdowns. 92

**National Filter Media Corp.** introduces Dacron, Polyethylene and Teflon fibers

to filtration in various weaves, weights and porosities. Resist chemicals, temperatures. **93**

### FURNACES

**Elektrokemisk A. S.** furnace for calcium carbide and ferroalloys, in sizes to 26,000 kw, combines rotating hearth feature with total enclosure, allowing fume control and permitting manufacture of very large units. Gives better overall economy with gas collection, more freedom in choice of raw materials. Coming soon is fume collection unit from electric smelting furnaces (ferro-silicon, etc.). **94**

**Dorr Co.** FluoSolids system has been adapted for zinc concentrate roasting for electrolytic or retort zinc production; offering closely controlled uniform temperatures and higher gas strengths. Means smaller gas volumes and reduced size requirements for gas cleaning equipment. **95**

**Harbison-Walker Refractories Co.** H-W C-mix, new ramming material of 92% MgO content for basic open hearth and electric furnace bottoms. Harwaco mastic, for sealing or filling V-shaped spaces on cold face of tangential boiler tubes and water walled boilers. Kaosil, semi-silica fireclay refractory of superior quality, has exceptional stability under loads. H-W Mullite, synthetic refractory with unusual uniformity of texture, stability of mineral composition, for use in vulnerable positions in high temperature furnaces. Also H-W chrome and H-W high alumina castable, which improve furnace life. **96**

**Harbison-Walker Refractories Co.'s** H-W Vegalite is a lightweight superduty silica insulating refractory, combining low density and high refractoriness; takes temperatures up to 3000 deg F; can be used to insulate silica brick and basic brick for higher temperatures. **97**

**Dwight-Lloyd, Inc.** Designed especially for firing fine grain pellets (taconite), has special high side pallets for requisite bed depths. Addition of Rowen Windbox seal virtually eliminates air leakage, saves on fuel and fan hp, and permits ready use of up-draft pre-heating and firing. **98**

**Pittsburgh Lectromelt Furnace Corp.** Gaseous reactor furnaces introduced in 1954 with capacities of one mol per hr and up, featuring automatic permanent electrode operation. **99**

### GEIGER COUNTERS

**Engineers Syndicate, Ltd.** Full line of giegers and scintillation counters with emphasis on model SC-8, mobile or airborne. **100**

**Dunkin Blue Print & Supply Co.** New counter for prospectors to give long range detection. Sensitivity increased for coverage of area. **101**

**Precision Radiation Instruments, Inc.** Complete line of radioactive material or metal, locating equipment, from the bargain-priced Snooper to the Model 118 Royal Scintillator at $1995.00. **102**

**Mt. Sopris Instrument Co.** Large crystal size gives higher counting rates. Weighs under 90 lb and circuit operates on vehicle power for added convenience. **103**

**Radiac Co.** Line of geiger and scintillation counters. Functional design, lighter weight, increased sensitivity for more efficient uranium prospecting. **104**

**La Roe Instruments, Inc.** Models FV-5, FV-5S and FV-5SS scintillation detectors can be converted in seconds from field prospecting units to probes for drill holes. **105**

**Fisher Research Laboratory, Inc.** Full line of geophysical equipment for exploration. Notable is refraction-seismic equipment. **106**

### GROUND SUPPORT

**Bethlehem Steel Co.** U-shaped rolled steel in ring or arch sets to dimensions, designed to withstand great down pressure, yields rather than deforms under pressure, letting surrounding strata stabilize naturally. Increase safety, install easily with minimum maintenance, have high recovery value. Bethlehem also offers roof bolts 2 to 10 ft long, accommodating 6-in. forged steel wedge. **107**

**Acme Machinery Co. Model** HSJ stoper Jumbolter. Mounted stoper with one or two drills, collects dust, enables two men to put up from 150 to 175 roof bolts per shift for lower unit cost. **108**

**Bethlehem Steel Co.** Type F expansion shell ⅝-in., expands to 1⅜, wedging sides firmly against hole. Square-head bolt is lighter, made of high-carbon steel, very effective in soft or medium top. Matching halves easily assembled in oversize soles. **109**

**Osmose Wood Preserving Co.** of America, Inc. "M-T-M" is a gelatinized form of Osmosalts, time-proven green-wood preservative, colored black. An effective "spot" preservative at critical points in mine timbers. "Pentox" gives seasoned lumber and timber a high degree of water repellancy; is also a primer and stabilizer. **110**

**West Virginia Steel and Mfg. Co.** Cone neck roof bolt and new expansion unit are size ¾-in. Bolt has large neck which centers itself in washer plate, avoids possible slippage from "keyhole" design. Wedgegrip design expansion unit is particularly useful in soft formations. Units are easier to install, lower in cost, can save you time in roof bolting. **211**

### HOSE AND PIPE

**Victaulic Company of America.** Snap-Joint boltless coupling now available in sizes for 1 to 8-in. pipe. Offers fast hook-up without use of tools. **111**

**Garlock Packing Co.** Rectangular and U-shape expansion joints for ¾ and 72-in. pipe, the latter primarily designed for vacuum conditions. Others for vacuum, pressure, or both; all reduce vibration, noise. **112**

**Gustin-Bacon Mfg. Co.** Gruvajoint, light-weight grooved-end pipe coupling, and Gruvagrip and Rolagrip for plain pipe; Speedy, time and labor-saving. **113**

**Weatherhead Co.** Industrial hose and reusable couplings, CS-10 hose cutting and skiving machine, HD-1 hose and coupling easy storage unit. Ermetco flareless steel tube, brass tube and fittings for both. **114**

### HYDRAULIC MINING

**Chiksan Co.** New, improved model of the Intelli-Giant, the mechanized, precisely-controlled hydraulic monitor for placer mining or earth removal in general. Eliminates operator fatigue, simplifies control. **115**

### INDUSTRIAL GUN

**Remington Arms Co., Inc.** Model 400, 8 gage smooth bore gun fired from fixed mount is ideal for removing obstructions or slabs in inaccessible areas. **116**

### INSTRUMENTATION

**Heyl & Patterson, Inc.** "Olivo" moisture meter is applicable for rapid surface moisture determination of granulated, powdered and fibrous material. A portable, simple, accurate production line device. **117**

**Builders-Providence, Inc., B-I-F Industries.** DFT Dall flow tube is a low head loss, accurate differential producer. Extremely short laying length, very low weight, constant flow coefficient over wide flow range. **118**

**Femco, Inc.** has a remote, long-distance control system for greatly increased efficiency and production. Range from one control and one indicator to 100 each, all operable without special wiring. Usable on phone or power lines. **119**

**U.S. Electrical Motors Inc.** Varitrol pneumatic control for U.S. Varidrives from ¼ to 50 hp. Speed changes are made automatically by 3 to 15 psi signal from any standard control instrument. Another step toward automation in your mine or mill. **120**

**Bin-Dicator Co.** Bin level indicator has signal light built in and readily visible to operator; light controlled by toggle switch. Model "AL" eliminates need for home made signal lights, supplies its own light requirement in compact and practical form. Lowers cost in application. **210**

### LOADING

**Euclid Div., General Motors.** Trend to smaller scrapers for specific uses in pits and construction is met with the new, highly efficient S-7, Euclid's first overhung scraper, for performance plus. **121**

**Sauerman Bros., Inc.** 18 cu yd Crescent-Wide scraper is 4 ft wider and handles 3 yd more than any other previous Sauerman scraper. Greater opening increases width of operation and reduces dragline shifts. Adapted for bank grading. **122**

**Long Co.** Model 88 Pigloader loads at 5 tons per minute, is exclusively designed for use with Long Piggyback system of mining, low and narrow in construction, combines low maintenance and high capacity loading, less men underground. **123**

**Alloy Steel and Metals Co.** Pacific Slushmaster is tough, strong, improved for your needs. Check its use to boost your production. **124**

**Vulcan Iron Works Co.** A New 105-hp gasoline driven slusher hoist, a 150-hp extra-heavy duty unit, and a series of models in the range from 15 to 75 hp give Vulcan a pretty wide coverage of the slusher field in capacities up to 1000 tph. **125**

### LUBRICATION

**Fiske Brothers Refining Co.** Lubriplate No. 630-AA, featured item, is waterproof, has high load-carrying ability, is one of the series of Lubriplate products which aid you in cutting costs, lowering maintenance. **126**

**Standard Oil Company of California.** RPM multi-purpose automotive grease for lubrication of chassis, universal bearings in cars, trucks and wheel type tractors. Cuts lubrication time, product inventory, loss due to contamination, investment in dispensing equipment, misapplication of lubricants and time required to train lubrication man. **127**

**Jet-Lube, Inc.** AP-5 is a non-melting all purpose grease covering 85-95% of all lubrication needs. **128**

### MAGNETIC SEPARATORS

**Stearns Magnetic, Inc.** Type R cross belt magnetic separator. Close control makes possible separations of materials with very similar characteristics. Model on display at AMC show in San Francisco was sold to convention visitor. **129**

**Dings Magnetic Separator Co.** Elimination of loss from power failure, shorting out and saving of floor space is possible through use of Alnico magnets. Eighteen are now in use in HMS plants. **130**

### MATERIALS HANDLING

**Armstrong-Bray & Co.** This 17½-ton Hydragrip hydraulic puller is said to be the only single ram gear-pulling unit on the market. Easily maintained, the unit speeds removal of gears, wheels, bearings stuck onto a shaft, as well as other pushing and pulling jobs. **131**

**Gripholst, Inc.** Hoist built on the draw vice principle, nominal power of 3300 lb. Can handle loads of all kinds, in any direction, at any distance or height. **132**

### POWER

**Buda Co.** Butane-propane engine for off-highway trucks. All parts are physically interchangeable with company's diesel engine to let you take advantage of cheapest fuel available. **133**

**Waukesha Motor Co.** Model 6-WAKDS supercharged diesel engine (352 hp) uses new system of turbocharging, run off exhaust. It has no parasitic load, is particularly effective in high-altitude operation. **134**

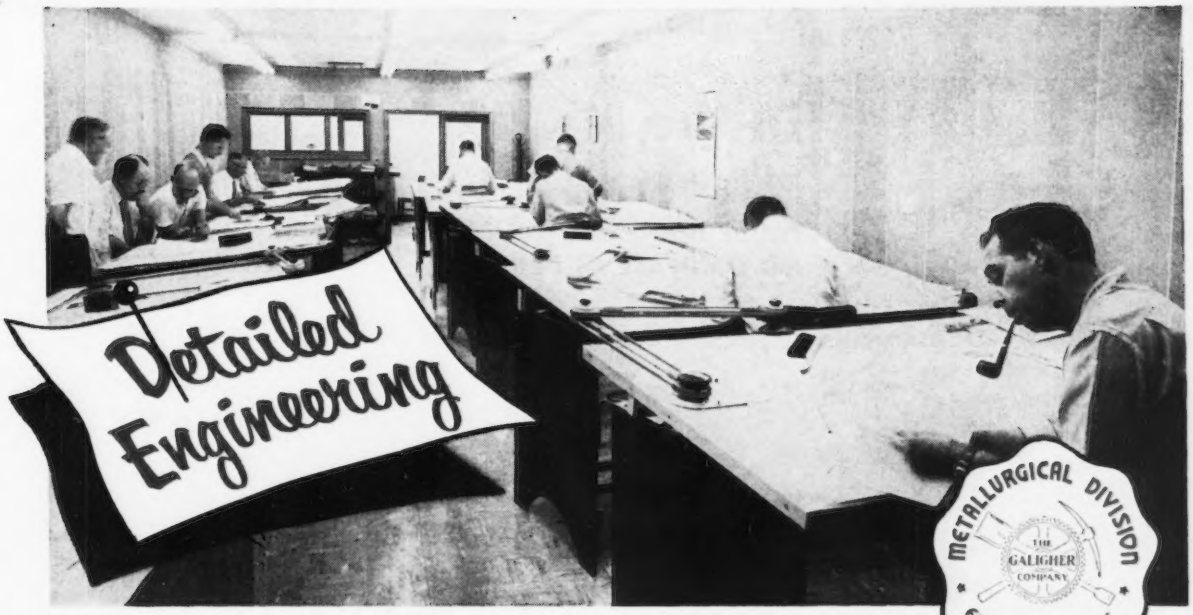
**Detroit Diesel Engine Div., General Motors.** Better fuel economy, increased hp and longer life are new gains in series "71" diesels. Other changes, in GM's single 6-110 diesel ups output to 300 hp maximum and 230 hp continuous. There's more on series "51", too, for cheaper, smoother operation. **135**

**Hercules Motors Co.** 3 to 500 hp, 32 series and 70 models of engines, gasoline and diesel, for all requirements of the industry. **136**

**Cummins Engine Co., Inc.** PT fuel system is now standard on all Cummins engines and adaptable to all models since 1932. Simple in design and assembly, low maintenance, overall economy. **137**

### POWER TRANSMISSION

**W. A. Jones Foundry & Machine Co.** Redesigned line of continuous tooth herringbone gear speed reducers contains more standard sizes than any other. Higher hardness gearing and larger




# Guided by 342 years of 'Keyman' experience

**GEOLOGICAL DIVISION**
**Geological Investigation**

**METALLURGICAL DIVISION**
**Metallurgical Testing**
Laboratory Testing
Flowsheet Development

**Field Metallurgical Consultation**
Metallurgical Test Results
Economics
Flowsheet Determination
Pilot Plant Test Supervision
Consultation on Metallurgy and Operations

**Engineering and Plant Design**
Preliminary Estimates
Cost Studies
Plant Layout and Engineering
Detailed Plant Design

**Engineering Supervision of Construction**

**Metallurgical Engineering**
Start Up Plant Operation
Training of Plant Personnel

The above picture shows a portion of our expanded design and engineering facilities. This department is supervised by 11 key men with an aggregate experience of 342 years.

This experience is YOURS to profit by at the merest signal of interest. Our skilled corps of engineers and technicians got it the hard way.

**. . . through geological 'spade work' in the field—process development in the laboratory and plant . . . equipment improvization, no patterns to follow — design for mills with novel production problems—and engagement in scores of other metallurgical projects that demand scientific know-how and imagination.**

The combined experience of this competent staff is yours to command. Either they have already solved a problem like yours or they will mobilize for action and come up with the practical and economical answer.

Write for details on an engineering service that has been profitably applied in major mining areas of the world.

**Manufacturers of Commercial and Laboratory AGITAIR, Vacseal Pumps, Acid-proof Sump Pumps, Laboratory Ball Mills, Geary-Jennings Sampler, Geary Reagent Feeder and Laboratory Pressure Filters.**

**HOME OFFICE**
545 West 8th South
Salt Lake City, Utah
P. O. Box 209

**EASTERN OFFICE**
921 Bergen Avenue
Jersey City, New Jersey

Agents In All Principal Foreign Mining Districts

# THE GALIGHER CO.

METALLURGICAL DIVISION · THE GALIGHER COMPANY · ENGINEERING SERVICE

**CONSULTATION • ORE TESTING**
**PLANT DESIGN • GEOLOGIC INVESTIGATION**

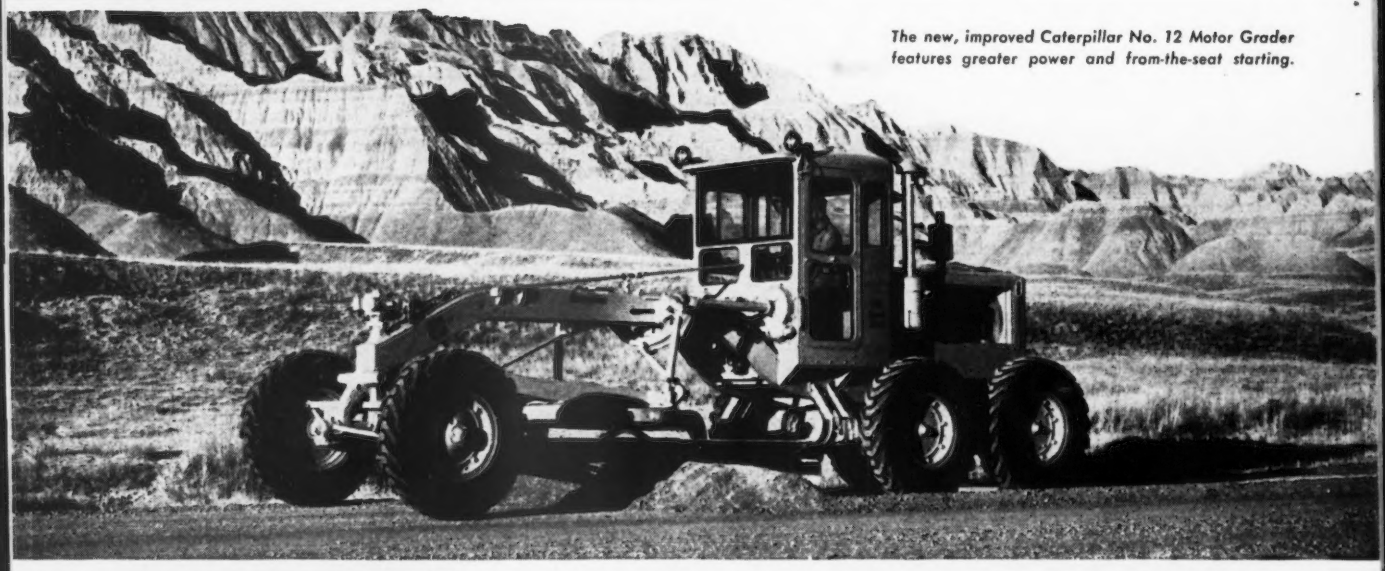
# NEW

## in the No. 12

***115 HORSEPOWER***

***A 15% INCREASE IN POWER***

***NO INCREASE IN PRICE***



*The new, improved Caterpillar No. 12 Motor Grader features greater power and from-the-seat starting.*

# NEW

## in BOTH No. 12 and No. 112

**One-lever from-the-seat starting**

**Accelerator-decelerator pedals**

**Improved hand throttle**

**Redesigned instrument panel in easy-to-read location**

**No increase in price**

Now there's a new high in performance in CAT* Diesel No. 12 and No. 112 Motor Graders. In keeping with Caterpillar's policy of constant product improvement, both these rugged machines incorporate new features that increase their profit-making capacity. The new No. 12 packs more power, 115 HP—and has faster reverse speeds—low reverse, 4 m.p.h.; high reverse, 6.3 m.p.h. For durability, the capacity of the transmission and clutch has been increased to match the greater horsepower. Other improvements, standard in both the No. 12 and No. 112, are: convenient one-lever from-the-seat starting and the accelerator-decelerator pedals that permit changing speeds without changing throttle setting.

With these and other new features, you can figure on even *more* work at lower cost from the No. 12 and No. 112. Along with the No. 212, they are the only motor graders whose major components are built entirely by one manufacturer and serviced by one organization. Their performance record is unmatched—more than 99% ever built are still in use. Ask your nearby Caterpillar Dealer to show you how these machines can step up production and profits for you!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

**CATERPILLAR***

*Both Cat and Caterpillar are registered trademarks—®

**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

# New Products Review—What's New About Them—How They Will Help You

bearings and shafts pack more hp capacity in same size housing. **138**

**Twin Disc Clutch Co.** Improved models of the company's 3-stage torque converters, now is used on heavy-duty trucks in open pit mining. **139**

**Raybestos-Manhattan Co.** Poly-V belt permits smaller sheaving, shorter centers, better power transmission. **140**

**Rollway Bearing Co., Inc.** Complete line of cage type cylindrical roller bearings where all rollers are crowned including steel separated, segmented and full roller types. **141**

**J. D. Christian-Engineers.** Manufacturers of all types of speed changers, power transmission devices, in range of types and sizes, for better performance **142**

**Reeves Pulley Co.** Varied speeds "at the touch of your hand" on the redesigned, high hp, small-size Reeves motor pulley. One lubrication point, usable on any type straight face pulley on driven machine, excellent touch-control. **143**

**Bico, Inc.** makes a full line of flat belts, V-belts, vertical and direct driven models, rugged and efficient. **144**

**Dodge Manufacturing Corp.** Taper-Lock bushings, Taper-Lock solid steel conveyor pulleys, Dodge-Timken all steel pillow blocks, Dodge Torque-arm speed reducer. **145**

**Reliance Electric and Engineering Co.** V-S drive, an electrical transmission permits smooth starting and quick stopping. Operators can start drive without use of clutches and stop instantaneously with electrical braking that nevers wears out or needs adjustment. **146**

**Western Gear Works.** Speed reduction in all its phases. Transmission **gear** boxes, speed increasers, high-speed units, gear motors, torque converters, right angle drives and open gearing. **147**

**Tool Steel Gear & Pinion Co.** TSP sprockets hardened by the company's special process. Surface to permissible wear depth has a file-hard surface. Core refined for toughness and ductility gives maximum strength. **148**

**Philadelphia Gear Works.** Sphereflex gear coupling has mall teeth cut on a spherical arc, internal teeth from a straight root. Coupling flexibility is no longer dependent on backlash, point contact or springs. **217**

## PROTECTIVE COATINGS

**Gates Rubber Co.** Rubber facing of your equipment fights corrosion and slows wear. Life can be increased up to 8 or 16 times. A new and better solution to corrosion and abrasion problems. **149**

## PUMPS

**A. R. Wilfley & Sons Inc.** One to 8-in. rubber lined sand pumps. New design in rubber covered runner construction and one piece case liner mean longer life, quicker change of wear parts, lower assembly and replacement costs. **150**

**Galigher Co.** Acid-proof solids handling pumps for abrasive pulps and corrosive solutions. Vacseal is virtually a glandless pump, which still retains the desirable features of a heavy suction unit. **151**

**Allen-Sherman-Hoff Pump Co.** Centriseal pumps are maximix rubber protected, operate entirely without sealing water. Provides longer life, easily replaceable, molded parts. And for abrasive pumping—Hydroseal. **152**

**Nagle Pumps Inc.** Type "SW-O" for wet pit submerged operation; single-stage inverted entrance pump. Sizes 1 to 8 in., with capacities up to 1800 gpm and heads up to 100 ft. For abrasive mixtures, slurries, corrosive and hot liquids. No entrance pipe connections necessary. "SW-OB" has bottom entrance for quick-settling solids or intermittent operation where the inverted impeller-type SW-O might become loaded with solids when stationary. The answer to a tough problem. **153**

**Oliver United Filters, Inc.** Type L stainless steel centrifugal pump lasts longer, runs at low cost. **154**

**Western Machinery Co.** Wemco solids pump works on an entirely new pumping principle. For more information about its unique characteristics and how it will help you do a better job, please circle No. 155 on the reply card opposite p 42. **155**

**New York Air Brake Co.** Dudco PF-100 double pumps with valve panels for hydraulic control of equipment. Installation is accomplished with "plug-in" ease. **156**

## REAGENTS

**Philadelphia Quartz Co.** Metso Anhydrous, anhydrous sodium metasilicate will aid ore dressing by dispersing undesired siliceous material, by conditioning mineral surfaces. In clay refining can be used to increase fluidity of solids. **157**

**Stein, Hall & Co., Inc.,** Jaguar MD Series is a new vegetable colloid which is cold swelling and has high water taking and good gel forming properties. Useful as a flotation reagent, flocculant and depressant. **158**

**American Cyanamid Co.** offers AERO-FLOC flocculating and filtration aids, synthetic and generally effective at lower dosages than naturally occurring products; often giving flocculation of slimes where others fail. Provide increased filtration rates, firmer filter cakes, increased efficiency. **159**

**Clarkson Co.** offers an accurate, completely corrosion-resistant feeder for acids and acidic solutions. **160**

**Builders-Providence, Inc.** division of B-I-F, announces model EVS Chlorinizer for feeding chlorine gas in maximum capacities of 4 to 400 lb per day. Feed rate inspection of operation are visual. Low cost, easy installation. **161**

**Dow Chemical Co.** Separan 2610, a new flocculating agent used in dosages as small as one part per two million parts of dispersed solids, has increased recovery as much as 5%. Can be used to increase filter rates, cut moisture content of filter cake. **162**

## SAFETY

**E. D. Bullard Co.** Hard hats are first of metal to be permanently colored. Permits color coding of different type craftsmen for easy identification at a distance. **163**

**Santa Fe Tank & Tower Co., Inc.** The first combination vibration cut-off and safety switch for cooling tower fans. Prevents costly damage to your tower and assures complete safety to maintenance personnel. **209**

## SCREENS

**Simplicity Engineering Co.,** W-deck screen, now available on all Simplicity gyrating screens, permits more even flow of material, gives better screening, longer screen life. Side and center take-up provide faster screen changes. **164**

**Hewitt-Robins Inc.** Elliptex vibrating screen 6x24 ft, 30 to 50% more capacity than previous largest model. Strain-gaged construction, 4-point support and high carbon bolts give unit ruggedness for long life and low maintenance. **165**

**Nordberg Mfg. Co.** Symons vibrating rod grizzly, 50 in. wide, 8 ft long. Takes 12-in. feed for separations from ½ to about 4 in. Motor (10 hp) and variable amplitude drive mounted outside housing away from dust. Scalps over 400 tph with sharp separations in dry, wet, sticky, or gummy ore. Single cut or multiple separations. Heavy loads won't dampen vibrations. **166**

**Conveyor Co.** Mechanically vibrated screen has motion at right angles to the deck. More efficient and economical. **167**

**W. S. Tyler Co.'s** Ty-Rock screen holds an honored place in the field. Numerous applications; extremely versatile in materials and meshes. **168**

**Bixby-Zimmer Engineering Co.** Rod screens must be designed for the job they are to do. B-Z has a variety of shapes and sizes, to improve the life of your operation and make more money for you. **169**

## STEEL

**United States Steel Corp.'s** Carilloy T-1 steel, sold in plate form but can be rolled in other sections, combines exceptionally high strength (90,000 psi minimum tensile), toughness, fabricability and can be welded without pre- or post-heating. **170**

**Joseph T. Ryerson & Son, Inc.** Rycut series of alloy steels with lead added for faster machining. Up to 200% increase in production of machined parts compared to conventional alloy steels in same carbon range, is manufacturer's claim. Life of cutting tools is increased 300%. **171**

## SURVEYING

**Wild Heerbrugg Instruments Inc.** The T-1 repeating transits. Read to one minute, estimate to 6 secs. Objective prism, rugged compact construction make it especially useful for underground surveying. **172**

**Geo-Optic Co. Inc.** offers Askania Gigas Photo Theodolite, which photographs both circles with Robot 35mm camera (automatic release and film transport); saving time in completing a

## USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

Not good after Jan. 1, 1955 if mailed in the U.S. or Canada.

**NOVEMBER 1954**

NOT GOOD AFTER JAN. 1, 1955
If mailed in U. S. or Canada

Please send me further information about the items circled.

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14 | 27 | 40 | 53 | 66 | 79 | 92 | 105 | 118 | 131 | 144 | 157 | 170 | 183 | 196 | 209 |
| 2 | 15 | 28 | 41 | 54 | 67 | 80 | 93 | 106 | 119 | 132 | 145 | 158 | 171 | 184 | 197 | 210 |
| 3 | 16 | 29 | 42 | 55 | 68 | 81 | 94 | 107 | 120 | 133 | 146 | 159 | 172 | 185 | 198 | 211 |
| 4 | 17 | 30 | 43 | 56 | 69 | 82 | 95 | 108 | 121 | 134 | 147 | 160 | 173 | 186 | 199 | 212 |
| 5 | 18 | 31 | 44 | 57 | 70 | 83 | 96 | 109 | 122 | 135 | 148 | 161 | 174 | 187 | 200 | 213 |
| 6 | 19 | 32 | 45 | 58 | 71 | 84 | 97 | 110 | 123 | 136 | 149 | 162 | 175 | 188 | 201 | 214 |
| 7 | 20 | 33 | 46 | 59 | 72 | 85 | 98 | 111 | 124 | 137 | 150 | 163 | 176 | 189 | 202 | 215 |
| 8 | 21 | 34 | 47 | 60 | 73 | 86 | 99 | 112 | 125 | 138 | 151 | 164 | 177 | 190 | 203 | 216 |
| 9 | 22 | 35 | 48 | 61 | 74 | 87 | 100 | 113 | 126 | 139 | 152 | 165 | 178 | 191 | 204 | 217 |
| 10 | 23 | 36 | 49 | 62 | 75 | 88 | 101 | 114 | 127 | 140 | 153 | 166 | 179 | 192 | 205 | 218 |
| 11 | 24 | 37 | 50 | 63 | 76 | 89 | 102 | 115 | 128 | 141 | 154 | 167 | 180 | 193 | 206 | 219 |
| 12 | 25 | 38 | 51 | 64 | 77 | 90 | 103 | 116 | 129 | 142 | 155 | 168 | 181 | 194 | 207 | 220 |
| 13 | 26 | 39 | 52 | 65 | 78 | 91 | 104 | 117 | 130 | 143 | 156 | 169 | 182 | 195 | 208 | 221 |

My Name ..... Position .....

Company .....

Address .....

station and improving accuracy. Numerous other applications and advantages. 173

**Kern Instruments Co.** DK1 and DKM1 double circle theodolites combine lightness and great accuracy. DKM has optical micrometer. 174

**TRACK AND RAIL EQUIPMENT**

**C. S. Card's Iron Works Co.'s** improved rocker dump ore car includes a safety catch which keeps car from rolling toward operator. Catch has separate strikers and plates for each side. Eliminates accidental injury from unbalanced load. 175

**Gregg Car Co., Ltd.** All welded tray dump cars (25 tons) for underground service with semi-automatic dumping. Size permits replacement of 4 cars of 180-cu ft capacity and simple construction means lower maintenance costs. 176

**W. R. Stamler Co.** Short model of Stamler hydraulic car-spotter designed for shuttle-car service; 15,000 lb capacity and small size meet requirements of small track mine, handles smaller loads. 177

**Atlas Car & Mfg. Co.** offers a 40-ton diesel-electric car pusher capable of handling a string of railroad cars was designed to operate in heavy snow at Seven Islands, Que., where they are used to push ore cars to the dumper. Car pushers with folding side arms have also been introduced by Atlas. 178

**American Mine Door Co.** Now has hydraulic controls on its well-known mine track cleaner. Makes operation easier, safer. 179

**Goodman Mfg. Co.** Battery operated 9-ton locomotive for 18-in gage track. Deadman control increases margin of safety. 180

**National Malleable & Steel Castings Co.** Willison automatic couplers and National Rubber draft gears have wide applications in mine car use. 181

**TRACTORS, DOZERS AND LOADERS**

**Allis-Chalmers, Tractor Division.** Billed as "the biggest tractor in the world," the new HD-20 has a 175-hp diesel engine, a hydraulic torque converter drive, weighs 41,000 lb, has a maximum drawbar pull of 65,000 lb. 182

**Frank G. Hough Co.** Model TM Payloader tractor has 16,000 lb drawbar pull, available for adaption for railroad car switcher. Has 4-wheel drive and 4-wheel air brakes. Not tied to RR tracks, can walk across yard to next job quickly. Will do other towing, pushing and pulling in pits, on haul roads. 183

**Frank G. Hough Co.** Payloader in 12 to 24-ft bucket capacities incorporates new torque converter drive, power steering on larger model. Gives easier operation, faster, lower maintenance cost and greater output. 184

**Elmco Corporation.** Huge 105 prime mover with 12-ft hydraulic-controlled bulldozer blade, offering 40,000-lb maximum drawbar pull, simplified controls, torque converter - cushioned power, full visibility for operator, greater maneuverability. 185

**Tractomotive Corp.** TL-12, is one-yd, 4-wheel drive Tractoloader, companion of TL-10, 2-wheel drive, ¾-yd unit. 186

**International Harvester Co.** Among current leaders in earthmoving are 2T-75 tractor with 2W-75 bottom dump wagon, TD-24 crawler with cable bulldozer, Hough HRC Payloader, TD-9 crawler and UD-9 diesel power unit. 187

**TRUCKS—TRAILERS**

**Mack Motor Truck Corp.** LRX 10-cu yd, 15-ton truck. New 170-hp engine, 9-speed transmission, dual reduction gear type differential offer more time between overhauls and longer life. 188

**Athey Products Corp.** PR-21 rear dump trailer, 22.5 cu yd or 31 tons. Adds new work range to the Cat DW21. Twists and torques of high speed (20 mph) haulings are reduced and absorbed by all welded frameless construction. Makes non-stop turns in 34 ft. Individual brakes give accurate dumping control. 189

**Easton Car and Construction Co.** Biggest side-dump trailer ever built was recently designed and sold by Easton. Will handle 50 tons (iron ore) 36 tons (limestone). 190

**Dart Trucks.** Models 10-S and 20-S, 10-ton and 20-ton newly-designed end-dump trucks, with Cummins or Continental engines and a choice of torque converters on the larger model. Features offset cab for improved visibility, and various body and running gear improvements. 191

**Caterpillar Tractor-Athey Products Corp.** New rear-dump hauler, 22.5 cu yd capacity, 275-hp Caterpillar diesel engine. Can dump by pulling rear wheels forward or front wheels back. Body offers big, and low, target for shovel, unit can make 20 mph. 192

**LeTourneau-Westinghouse Co.** Tournapull, rear-dumping hauling unit; Tournatractor, 200 hp, up to 19.2 mph, bulldozer blade, torque convertor. Designed by LeTourneau to make costs shrink, output jump. 193

**Kenworth Motor Truck Corp.** Save time, maintenance cost with torque-equipped Kenworth model 802 diesel-powered end-dump truck. 194

**Koehring Co.** The 6 cu yd Dumptor can take grades up to 24%. Unit now has more than 6 hp for very gross ton of weight to provide adequate power, low cost, high output haulage. 195

**Allison Division (General Motors Corp.)** New braking device for trucks, Torqmatic brake, consists of a rotor assembled as an integral part of converter output shaft; stator vanes cast into the housing enclosing the rotor; and a control valve. Has no parts which can burn up or wear out with heavy usage. 196

**VENTILATION**

**Roots-Connersville Blower Div.** Complete line of Spiraxial compressors for pressures of 15 to 30 psig, handling 700 to 5000 cfm. New design permits more compact, more efficient and less expensive installations. 197

**American Brattice Cloth Corp.** Mine Vent flexible tubing is the standby of air carrying. Can make your ventilation engineer's job simpler. 199

**Bemis Bro. Bag Co.** Flexipipe ventilating systems are low-cost, adaptable. Bemis ore sample and ore concentrate bags can increase your efficiency. 200

**Flexible Tubing Co.** Spiratube-M and Ayrtube, rubber-coated fabric ducting specially built for rough mine usage, is extremely adaptable, portable and easily installed. Well worth your investigation, no matter what the ventilating problem. 201

**WASHERS**

**McLanahan & Stone Corp.** Newly introduced McLanahan coarse material screw washer, Model CM-1, in capacities of 60 to 85 tph in single screw washers; 105 to 225 tph double screw. Washes and dewaters ore, gravel, crushed stones about 2 in. in size. 202

**WELDING**

**American Manganese Steel Div.** exhibited the only complete automatic arc welder unit in the field designed for rebuilding track-type equipment parts. Weld deposit using Amsco AW 79 wire doubles part life. A semi-automatic flux welder is coming soon from Amsco. 203

**Stoody Co.** Four times faster than ordinary welder, 400-amp automatic welder is adaptable and portable. Flux powder can be changed with change of material in attached hopper. Use of high carbon wire is cheaper than most rods. 204

**WIRE ROPE**

**Broderick & Bascom Rope Co.** Revised Rigger's Handbook. A great aid to the man who works with wire rope and slings. 205

**John A. Roebling's Sons Co.** Wire rope recommendations and catalog. In 112 years of successful wire rope manufacture, Roebling has "acquired a bit of wisdom and many kinds of skills." Their handbook is available to help you get the most out of your wire rope. 206

**Leschen Wire Rope Div., H. K. Porter Co., Inc.** Flattened strand wire rope is finding more and more application. Hercules engineers can give you evaluations for its use in your installation. 207

**FURTHER INFORMATION** on all products reviewed here may be obtained by circling the numbers of the items about which you want more information on the postage-free reply card below. For faster service please mail the card early.

Next month the regular *New Products Digest* will be resumed.

FIRST CLASS
PERMIT NO. 64
(Sec. 34.9, P.L.&R.)
NEW YORK, N. Y.

**BUSINESS REPLY CARD**
No Postage Stamp Necessary If Mailed In The United States

Postage Will Be Paid By—

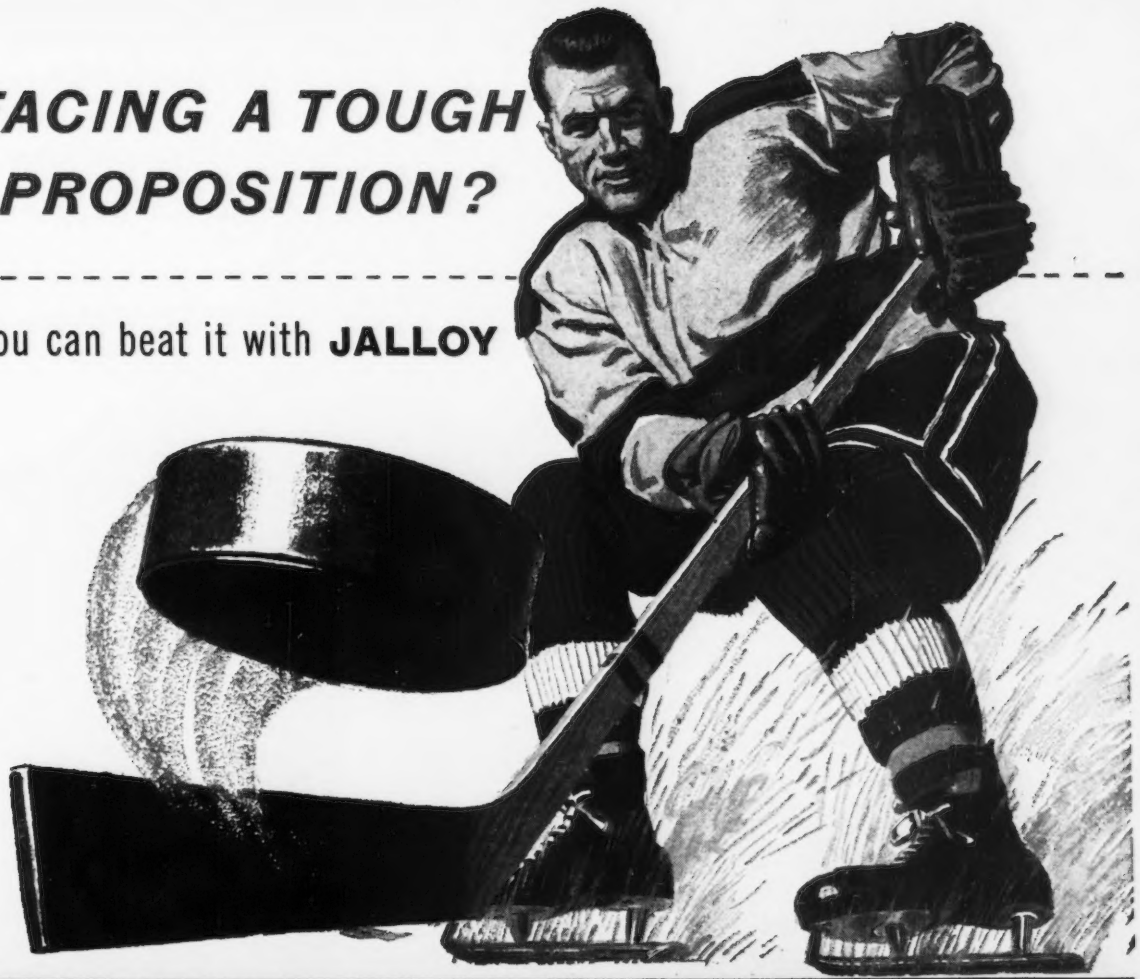
McGRAW-HILL PUBLISHING CO., INC.
ENGINEERING & MINING JOURNAL
330 WEST 42nd STREET
NEW YORK 36, N. Y.

**USE THIS CONVENIENT CARD**

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, on reverse side, tear out and mail.

# FACING A TOUGH PROPOSITION?

you can beat it with **JALLOY**



J&L JALLOY HEAT-TREATED PLATE BEATS WEAR DUE TO ABRASION

J&L Jalloy Heat-Treated Plate is the general purpose steel that is heat treated to provide longer wear on applications where impact and abrasive conditions are severe.

In comparison with other abrasion-resistant steels as well as mild steels, it gives optimum results when heat treated to a Brinell hardness of 340 and up. Jalloy permits savings in steel costs, maintenance, and repair. Furthermore, it is easily welded. Jalloy is available in three grades to meet various service requirements.

**Jones & Laughlin**
STEEL CORPORATION — *Pittsburgh*

**Complete data concerning CHEMICAL COMPOSITION... HEAT TREATMENT... WELDABILITY... PHYSICAL PROPERTIES... will be mailed to you promptly. Write today.**

**Jones & Laughlin Steel Corporation**
**3 Gateway Center, Dept. 412, Pittsburgh 30, Pa.**

☐ Please mail complete data concerning Jalloy.
☐ Please have your representative call.

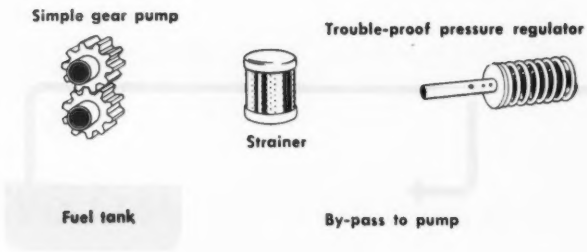
Name_____ Title_____

Company_____

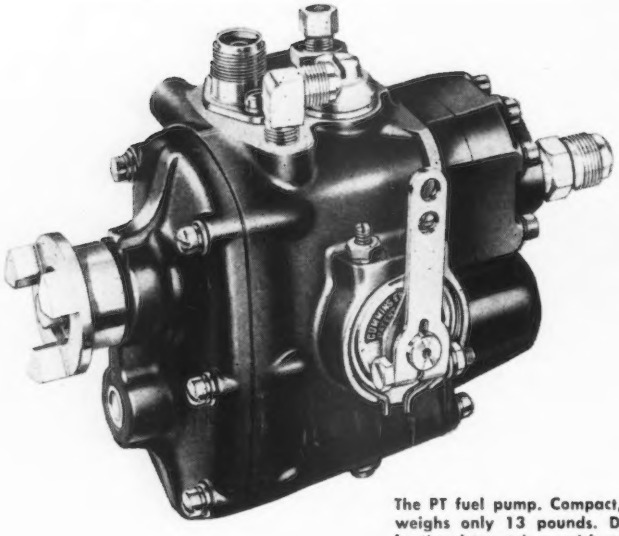
Address_____

# Here's the simplest diesel fuel system ever developed!

**Simplest pump and fuel control arrangement**




## *Cummins new* PT *fuel system...*

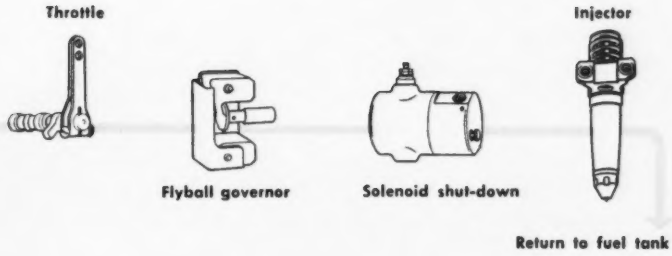


The PT fuel pump. Compact, easy to handle, weighs only 13 pounds. Does not have to be timed to engine, quick and easy to install.

The PT injector utilizes the exclusive Cummins principle of fuel injection which has set the highest standards of performance and economy for more than 20 years.

THE revolutionary new PT fuel system, now standard on all Cummins Diesels, has fewer and far simpler parts than carburetor and ignition systems or ordinary diesel fuel systems. It is easy to understand, simple to work with, can be serviced by any mechanic. No longer any need for fuel system specialists! The PT fuel system has undergone two years of field testing and millions of operating miles under every conceivable condition. Its dependability record is phenomenal. Operators report even less fuel consumption than with earlier Cummins fuel systems and far less cost of maintenance. The PT fuel system can be installed on any Cummins Diesel built since 1932.

**Cummins** *leader in lightweight high speed diesel power 60-600 h.p.*




**PT advantages over gasoline systems:**

| | |
|---|---|
| No contact points to adjust | No vapor-lock problems |
| No condenser to replace | No flooding |
| No spark coil to short | No choking or priming |
| No wiring harness to short | No needle valves to clog |
| No spark plugs | No butterfly valve |
| | No float level to maintain |
| | No float valve to stick |

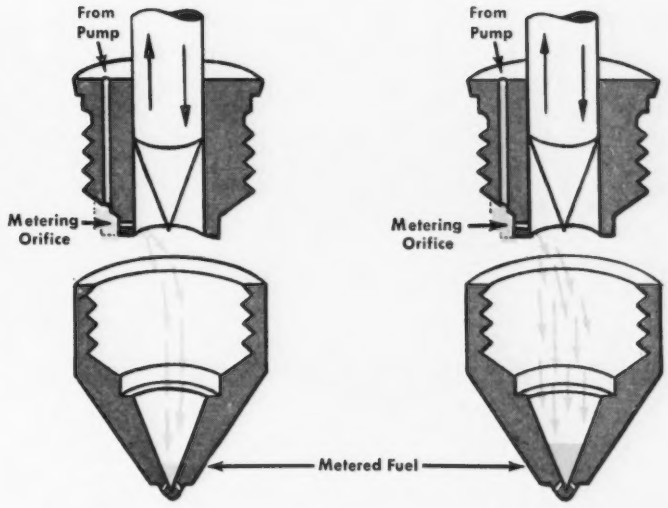
**PT advantages over ordinary diesel systems:**

| | |
|---|---|
| No fuel rack adjustments | No distributor discs |
| No check valves | No metering pumps |
| No needle valves | No high-pressure fuel lines |
| No helixes | No fuel pump timing |

# *. . . simpler to work with than gasoline carburetion and ignition*

## Simplest Fuel Metering Device

The principle is simply that the amount of fuel flowing through a fixed orifice varies according to the amount of pressure on the fuel. Pressure is controlled by the throttle on the PT pump. Fuel flow through orifice is cut off as injector plunger, actuated by engine camshaft, moves down to inject fuel.




When engine is under partial load, fuel pressure is low, and only a small amount of fuel passes through orifice into injector cup.

When engine is under full load, fuel pressure is increased, and greater amount of fuel passes through orifice into injector cup.

**Mail this today, and get more PT facts!**

**CUMMINS ENGINE COMPANY, INC., Dept. EM-11**
**Columbus, Indiana**

Please send me free illustrated folder, "Cummins PT Fuel System."

Name_____

Company_____

Address_____

City_____ Zone____ State_____

**CUMMINS**

**Ideal for Softer Rock Formations** – the new CP-555 Rotauger's fast, powerful rotary drilling motor and its entirely independent rotary feed motor combine to more than double your footage in the softer formations. And its short overall length permits set-up in restricted quarters. Available for wet or dry drilling, it drills 2½ inch holes in speeds of 2 to 4 feet per minute to depths of 100 feet or more.

# Whatever the job— there's a CP to drill it!

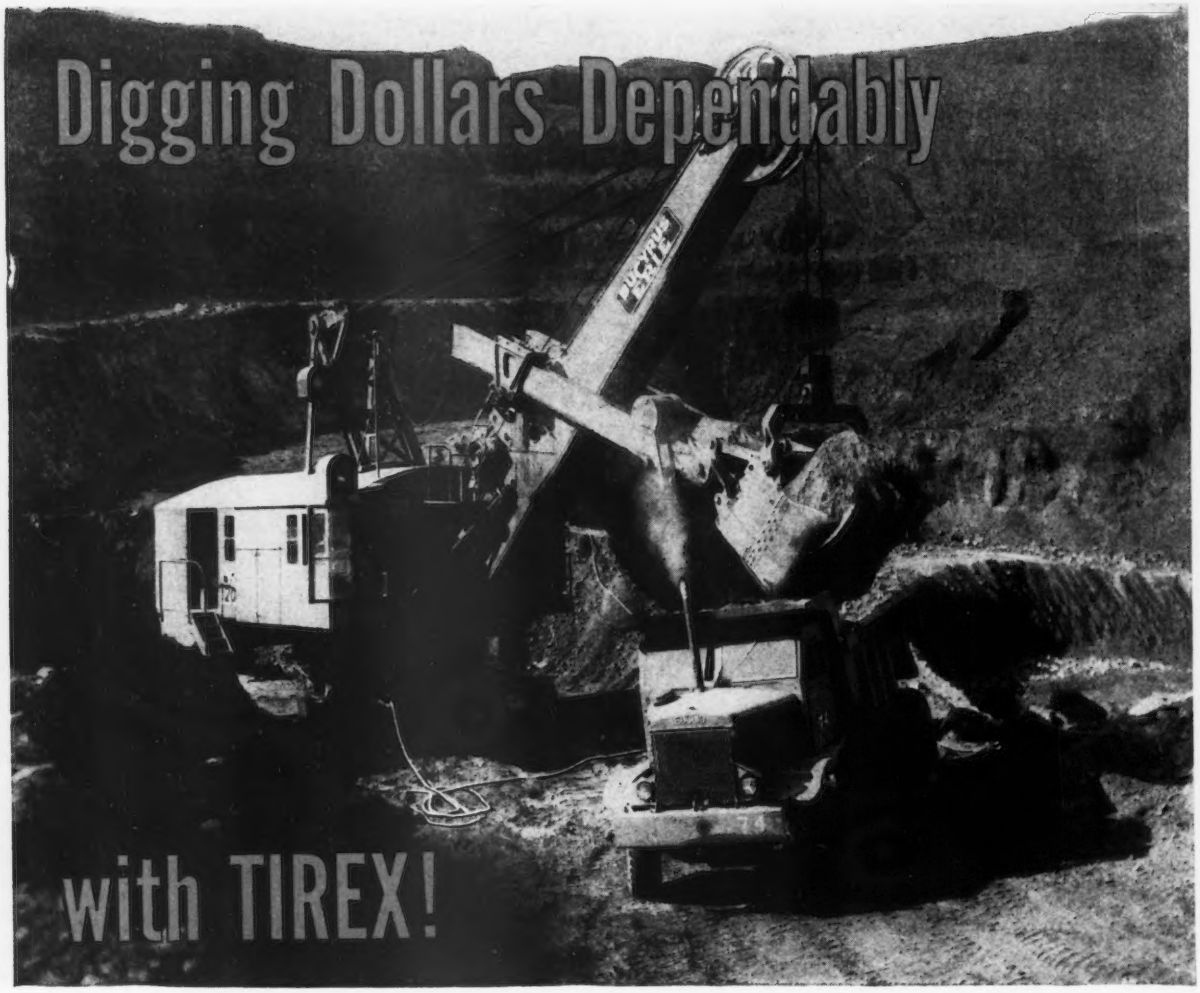
**Ideal for All Overhead Drilling**—the well-balanced CP-34 Stoper gets more advance every raise round. Because it has just the right piston speed, foot-pound blow, rotating speed and feed pressure it gets the most service and footage out of Tungsten Carbide Bits. A ratchet-type twist throttle on the holding handle affords fine control of feed-leg pressure. Button that provides instant safety release for feed-leg pressure is standard; rotation release optional.

**Ideal for Tungsten Carbide Bit Efficiency**—the CP Airleg takes constant recoil shock in its stride—holds drill firmly to the work. Exclusive CP ratchet type throttle maintains a pressure balance that compensates for line pressure variations and changes in rock formations . . . the steady bit pressure that results prevents "slapping" and minimizes bit breakage. Available with steel or aluminum alloy feed cylinder and with 36″ and 48″ feed travel.

The CP Airleg makes an ideal combination when teamed up with CP-32A and CP-59 Sinker Drills. The valve design of CP Sinker Drills maintains high drilling speed and economy of air. Fully cushioned for low maintenance, they're available for wet or dry drilling.

**Chicago Pneumatic** 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES




Open pit mines produce 78% of the nation's iron ore and 80% of its copper ore. Electric shovels dig the biggest percentage of this ore. With nearly 800,000,000 tons of open pit ore being dug annually, profitable production demands dependable shovel operation.

That's why Simplex-TIREX Type SH Cables power so many shovels used in open pit mining. They can be relied upon indefinitely. One percent of unavailability may offset 1% of superior performance when running. TIREX insures superior performance by reducing cable down time.

TIREX, because of its Selenium Neoprene Armor, is unequaled for balanced resistance to abrasion, water, acids, oils, sunlight, and flame. Despite sharp ground material, accidental crushing, and temperature, TIREX can always be relied upon for dependable service.

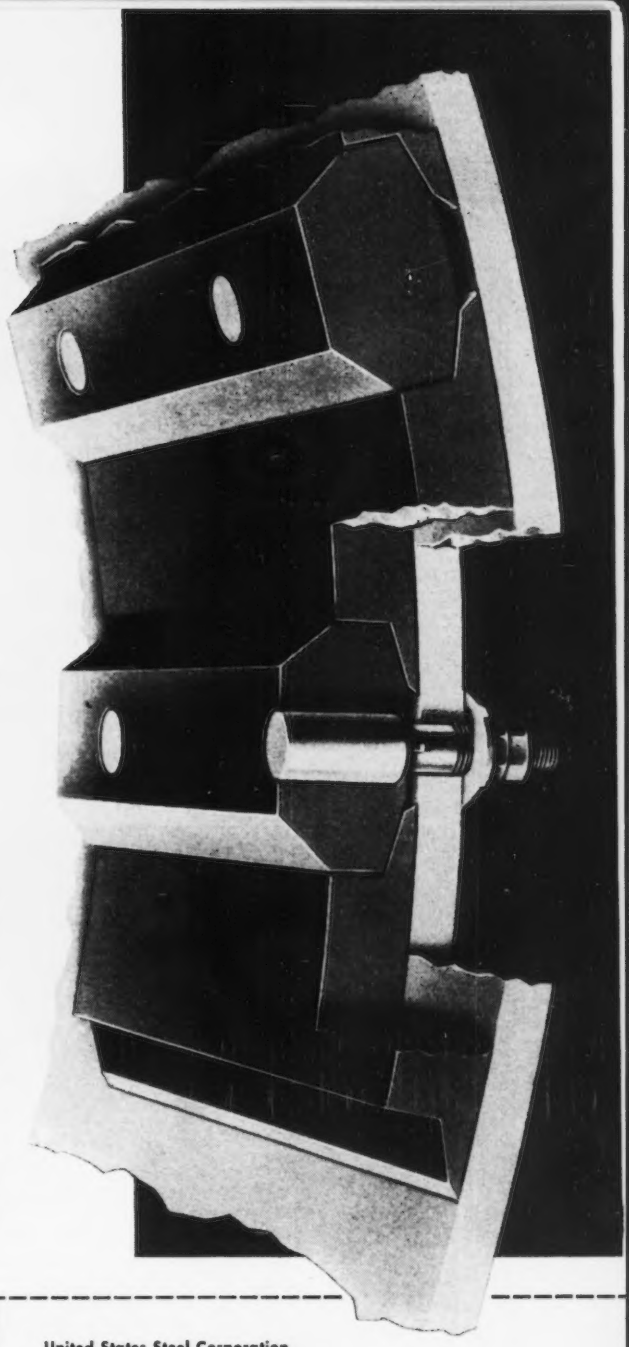
To dig more from open pit mines through greater electrical shovel availability, specify Simplex-TIREX Cables. For added toughness, all TIREX Cables are cured in lead. Write to the address below for additional information.

Simplex

TIREX CORDS AND CABLES *are made only by the*

**SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.**

# You can cut grinding costs four ways with USS Lorain Rolled Plate Linings



**1. Less "down-time" for repairs . . .**

You get longer, uninterrupted service with USS Lorain Rolled Plate Linings because tight fit between the ends of the plates and between the plates and lift bars eliminates shell wash and allied troubles that eventually cause costly repairs.

**2. Less time to install . . .**

USS Lorain Rolled Plate Linings are made to accurate size and in easy-to-handle sections that cut labor costs involved in installation.

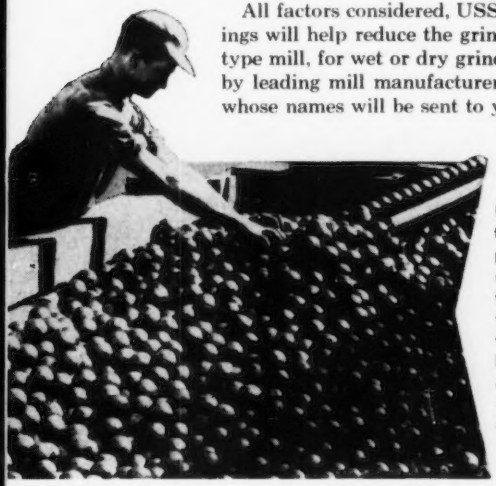
**3. More grinding area . . .**

Due to the great strength and abrasion-resisting qualities of USS Lorain Rolled Plate Linings, you can safely use thinner plates than would be required with less rugged materials. This permits greater usable diameter . . . increased output for each load.

**4. Full grinding value from each plate . . .**

You get maximum length of service from each USS Lorain Rolled Plate Lining. And severe localized wear at the feed or discharge ends can be easily compensated for by reversing the worn plates at opposite ends.

All factors considered, USS Lorain Rolled Plate Linings will help reduce the grinding costs-per-ton, in any type mill, for wet or dry grinding. They are distributed by leading mill manufacturers throughout the country whose names will be sent to you upon request.



**USS Grinding Balls are carefully made of special composition steel to take long, rough wear evenly. Samples from each production lot are thoroughly checked for surface hardness and maximum hardness penetration. They are available in sizes from ¾" to 5". For further information, mail the coupon.**

United States Steel Corporation
Room 4525, 525 William Penn Place
Pittsburgh 30, Pa.

Without obligation on my part, please send me your FREE booklet on USS Grinding Balls.

Name .....

Company .....

Address .....

City ..... State .....

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

## USS LORAIN ROLLED PLATE LININGS *and* USS GRINDING BALLS

USS

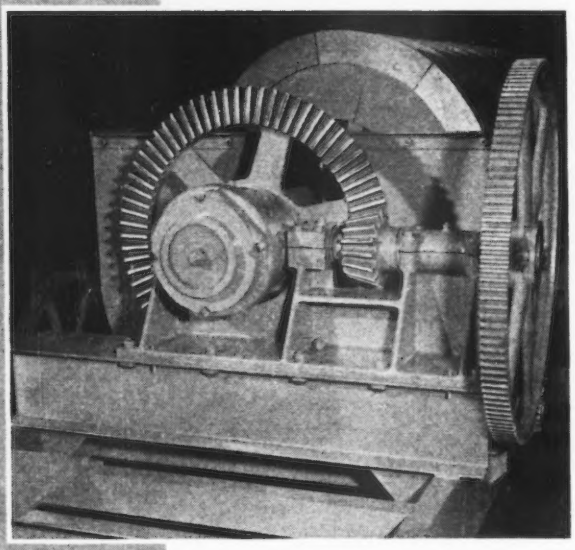
4-2072

UNITED STATES STEEL

# how AKINS

## leadership in mechanical performance can help you cut costs

Classifiers and heavy media separators are selected on the basis of low-cost-per-ton output resulting from efficient, dependable mechanical and metallurgical performance. That's why so many successful mining companies throughout the world continue to order *and reorder* Akins.



## for example...

### *the gears*

- **Meehanite metal gears**
  the bevel gear and spur gear are made of Meehanite metal. With Meehanite it is possible to obtain definite pre-determined and uniform properties to best meet the requirements of each application. Its uniform density, high tensile strength, and fatigue strength provide special qualities of toughness and resilience.
- **faced bevel gear and bevel pinion**
  the Meehanite bevel gear and cast steel bevel pinion have faced teeth...they run smoother and quieter, last longer.
- these features, like the patented submerged bearing and rugged main shaft, result in more efficient operation—thus, low-cost-per-ton production.

## WRITE FOR CATALOG

## COLORADO IRON WORKS CO.

**1624 17th Street • Denver 2, Colorado**

**AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS**

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO.

***Licensed Manufacturers and Sales Representatives:***
Canadian Locomotive Co., Ltd., Kingston, Ont., Canada
John Carruthers & Co. (Pty.), Ltd., Sydney, Australia
Head, Wrightson & Co., Ltd., Stockton-on-Tees, England
Head, Wrightson & Co., S. A. (Pty.), Ltd., Johannesburg

***Sales Agents:***
Andrews and George Co., Inc., 5 Shiba Park, Tokyo, Japan
Continental Sales and Equipment Co., Hibbing, Minnesota
Edw. J. Nell Co., Manila, P. I.
Wright Bros., Credit Foncier Bldg., Vancouver, B. C., Canada

# Cyanamid REAGENT NEWS

## *Cyanamid 300 Series*
## AERO* XANTHATES

Important producer of a full line of xanthates, Cyanamid offers in the 300 Series AERO Xanthates a choice of six reagents with a wide range of promoter activity. Used alone, these xanthates are excellent bulk promoters for sulfides, metallic minerals and, after sulphidization, oxidized base-metal minerals.

While results with xanthates alone have been good, combinations of xanthates with AEROFLOAT® promoters have frequently produced better pound-for-pound promoting strength and optimum froth characteristics on many minerals. AEROFLOAT 208 with AERO Xanthate 301, for instance, is widely used in the flotation of pyritic gold ores.

Cyanamid Field Engineers are familiar with separations achieved using xanthates and xanthate-AEROFLOAT promoter combinations in mills the world over. They can help you to short-cut your own test work whenever a new reagent set-up is under consideration. Their suggestions will be practical and unbiased . . . since Cyanamid produces a complete line of flotation reagents available from strategically-located stocks.

*Trade Mark.


AMERICAN Cyanamid COMPANY

MINERAL DRESSING DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

*Cable Address — Limenitro, New York*

NORTH AMERICAN CYANAMID LIMITED
Royal Bank Bldg., Toronto 1, Ontario, Canada
CYANAMID DE MEXICO, S. A.,
Apartado No. 26012, Mexico 12, D. F., Mexico

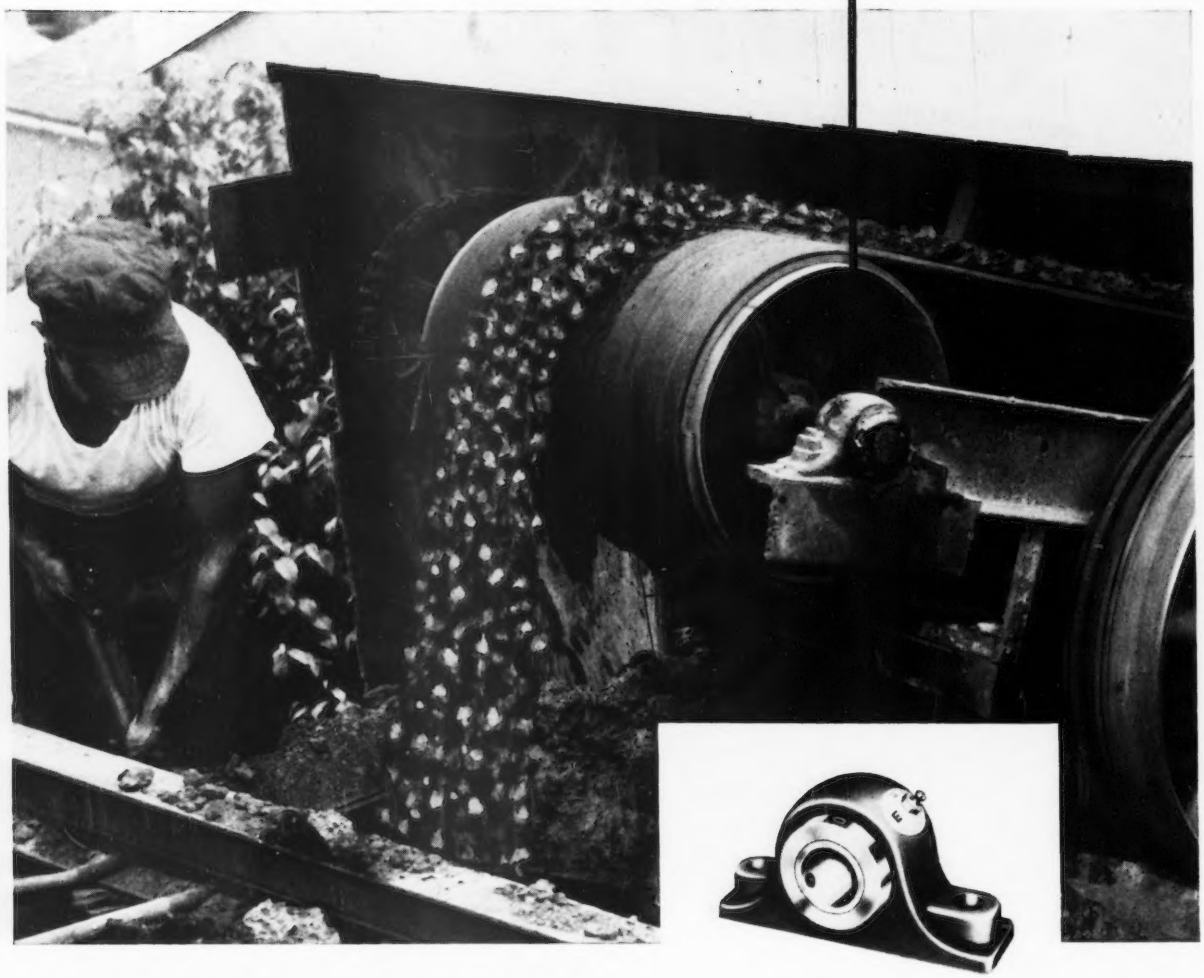
CYANAMID PRODUCTS, LTD., Bush House,
Aldwych, London W. C. 2, England
SOUTH AFRICAN CYANAMID (PTY.) LTD.,
P. O. Box 7552, Johannesburg, Union of South Africa

E. P. CADWELL, Casilla 12983,
Correo 11, Santiago, Chile
G. B. O'MALLEY, MALCOLM GLEN,
377 Little Collins St., Melbourne C. 1, Australia

**COMPLETELY ASSEMBLED**
**FACTORY ADJUSTED**
**PRE-LUBRICATED**

# SEALED

***—ready to mount on the shaft!***



# DODGE-TIMKEN *America's Quality Pillow Block*

Extra measures are taken to build superior quality into Dodge-Timken Bearings; and extra precautions are taken to keep that quality *intact*—from the factory to distributor to you to your machines.

These bearings are sealed in manufacture—an integral part of Dodge-Timken design. Their inbuilt precision is protected *both on and off the shaft.* That is one reason why they easily deliver a minimum of 30,000 hours of service. Want evidence? Look around you. No other pillow block is so widely used on the nation's tough jobs. Dodge-Timken dependability has been proved in *millions* of installations.

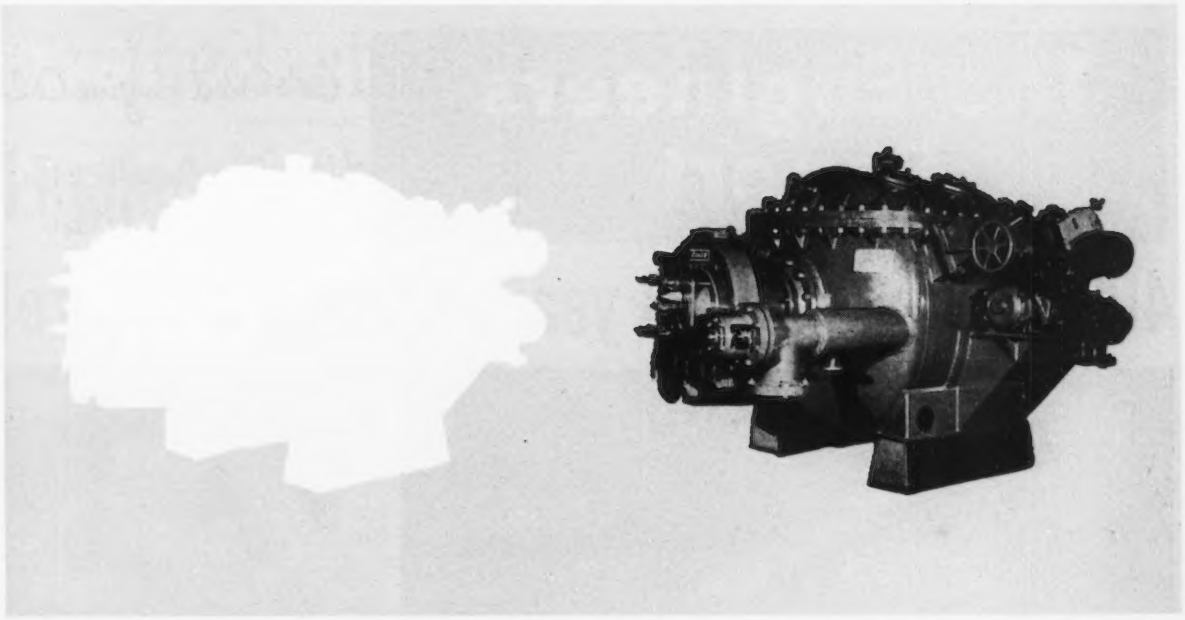
There are 5 types of Dodge-Timken Pillow Blocks for all types of service, in shaft sizes from 1 3/16" to 10". Also Dodge-Timken Hanger Bearings, Flange Bearings, Take-ups.

**DODGE MANUFACTURING CORPORATION, 3100 Union St., Mishawaka, Indiana**

**DODGE**

**of Mishawaka, Ind.**

***CALL THE TRANSMISSIONEER,*** your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.



# Price or Performance?

When you have a place for a filter in your flow sheet and the function of this particular step is important, your purchasing should be done on the basis of performance and not price.

If you buy on the basis of performance, with specifications and design guaranteed to meet the performance, your first choice will be an Eimco.

If your work, however, can be satisfied with so many square feet of filter area and your first consideration is price, there are many able to supply your needs.

Eimcos are not cheap because they have built into them the heavy construction, the precision design and the unique know-how that comes with more than half a century of sucecssful experience.

Eimco will devote to your filtration problem, be it vacuum or pressure, the skill of its trained engineers in research, testing, design and construction. It will then guarantee successful results duplicating the test work necessary to prove your flow sheet.

Does your process need the best? If it does and you are willing to look beyond first cost, it will pay you to have Eimcos at the start.

**THE EIMCO CORPORATION**

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Texas Birmingham, Ala. Duluth, Minn. Kellogg, Ida. London, Eng. Paris, France Milan, Italy

B-75

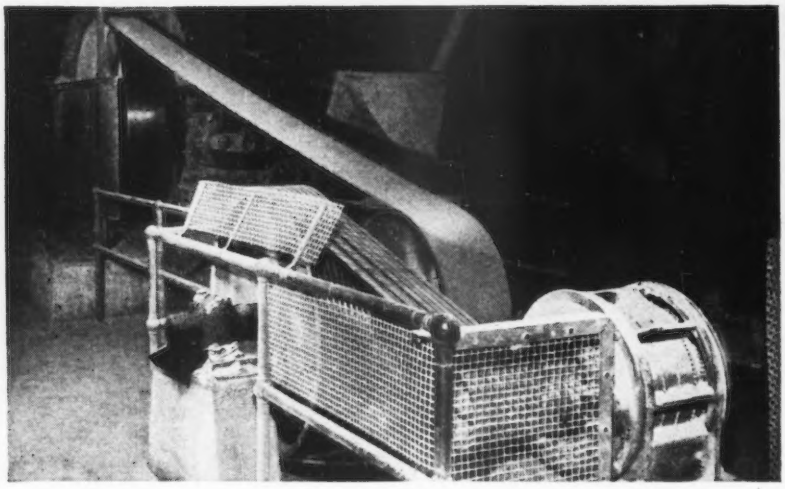
*You Can't Beat An Eimco!*

# The Engineer's Report

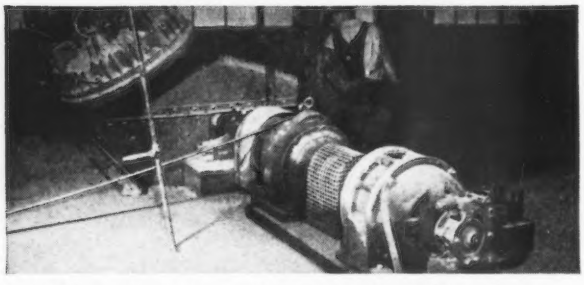
CASE HISTORY
Calol Red Engine Oil
LUBRICANT

Utah Ore Sampling Co.,
FIRM Murray, Utah

# 400 bearings run 13 years without a failure!



CALOL RED ENGINE OIL is used in the more than 400 bearings (examples pictured) in the Utah Ore Sampling Co.'s crusher plant at Murray, Utah. Not a single one has failed due to lubrication in 13 years of using Calol Red Engine Oil, according to Lee Bowen, Master Mechanic. When one cone crusher was overhauled recently after 6 years operation, all bearings were in good condition and were put back in service. This concern crushes and samples ore for independent operators in both North and South America.



BEARINGS RANGE from ½" to 7½" DIAMETER. They are lubricated by force-feed, circulating systems and ring oilers. Calol Red Engine Oil comes in grades to meet requirements of a wide range of conditions.

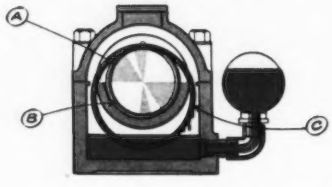
FREE CATALOG: "How to Save Money on Equipment Operation" will be sent on request to Standard Oil Company of California, 225 Bush Street, San Francisco.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your distributor, write or call any of the companies listed below.

CALOL

TRADEMARK "CALOL" REG. U. S. PAT. OFF.

## How CALOL Red Engine Oils cut industrial lubrication costs




A. Solvent-refined selected mineral oils. Exceptional stability prevents formation of deposits and assures lubrication.

B. Have low carbon residue and pour tests —provide wide range of application in external lubrication of general industrial machinery.

C. Pick up well on ring oilers, may be applied by all types of oiling systems.

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

# The Facts Behind Allis-Chalmers Leadership in Torque Converter Tractors

***Fourteen* years of experience . . . *eight* years with production models . . . *thousands* of torque converter tractors out in the field . . . *millions* of operating hours on every kind of work.**

TODAY'S tractor owners have given their "stamp of approval" to torque converter drive—as a key factor in the new standards of tractor performance they need for today's closely-bid jobs. Here's why —

**Automatic Matching of speed and pull** to load and terrain conditions . . . more dirt moved every hour, day in and day out.

**Hydraulically cushioned protection** for engine, clutch, transmission, rear end. The entire tractor lasts longer! That means less downtime, lower maintenance costs, more profit.

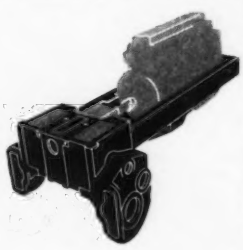
**Operators love it!** Allis-Chalmers torque converter tractors are so easy to handle (most shifting is eliminated) that operators do a top-notch job all day long.

Yes, the industry's most experienced men are demanding and buying torque converter tractors . . . *and in this, Allis-Chalmers leads the way.*

But, remember, you don't buy just one feature . . . you buy a *tractor*, with torque converter drive designed as a matched part of the entire machine. This advanced drive is only *one* of the many outstanding features that have switched so many leading contractors to Allis-Chalmers tractors. So . . .

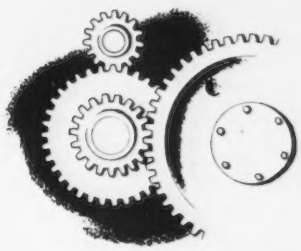
## Check all these features before you buy!

**All-Steel Box-A Main Frame** with one-piece, rear-end housing gives improved weight distribution, soaks up shocks, provides better equipment mounting, greater servicing ease . . . longer equipment life.



**Service Simplicity of Unit Construction** — Power drive components can be easily removed, repaired or replaced without disturbing adjacent parts . . . saving time and money.

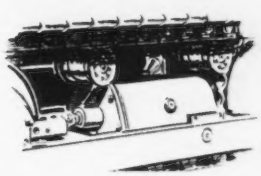
**"Live" Sprocket Shafts** — "Live" shafts with straddle-mounted bearings permit small, more serviceable seals. Double reduction final drives with smaller gears and shorter, heavier shafts mean extra ground clearance, better alignment, longer life.



**1,000-Hour Lubrication** — Tapered roller bearings and positive seals on truck wheels, idlers, support rollers and final drives extend lubrication intervals, cut downtime.

**Hydraulic Booster Steering** — Gives operator small tractor maneuverability with new ease. In addition, self-energizing brakes which take hold with a firm, uniform grip, provide exact control and sure safety with less pedal pressure.

**True-Dimension Track** provides maximum ground contact . . . plus the right design, the best steels for every job condition . . . heat-treated for long life with the industry's newest, most complete facilities.

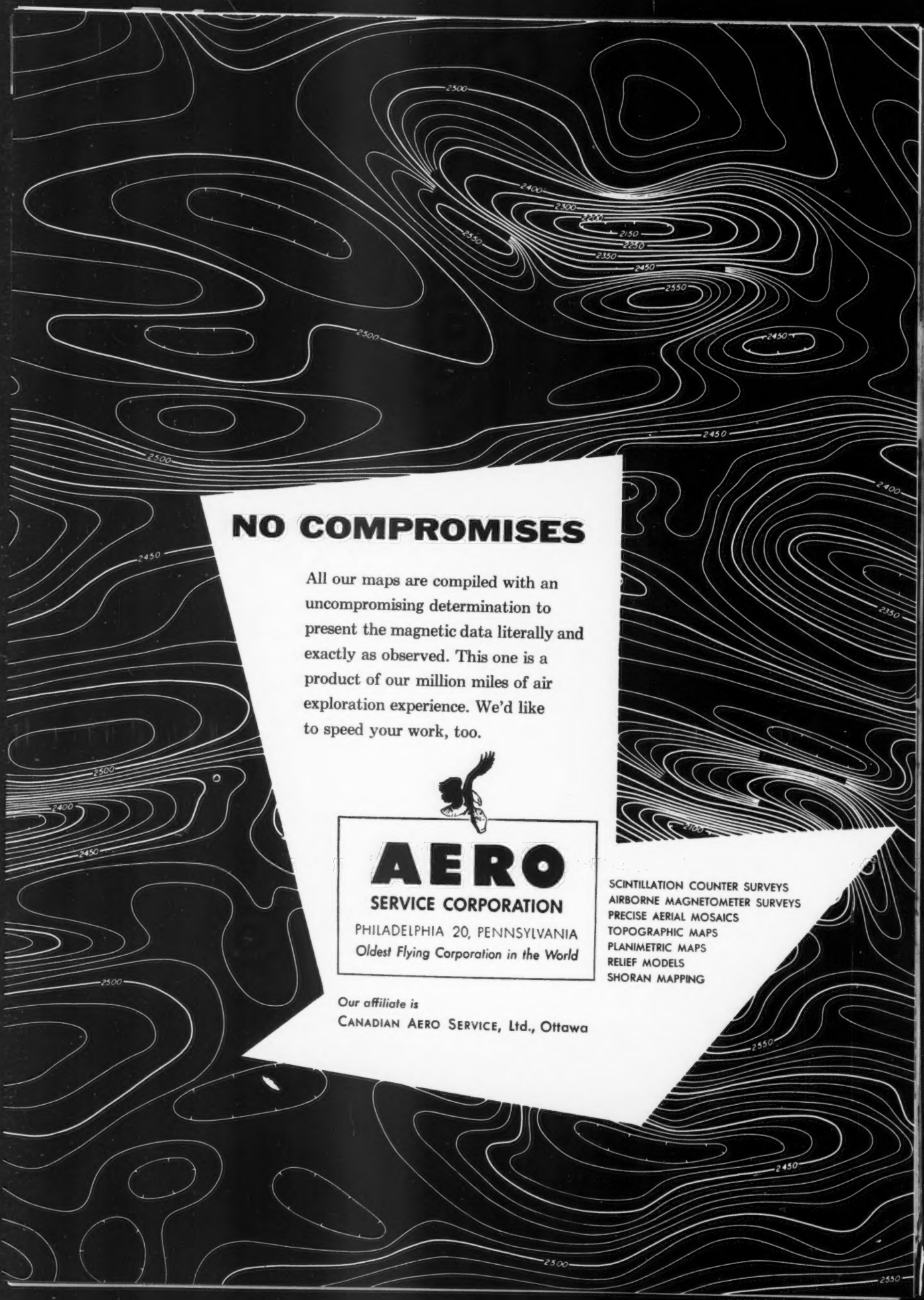


**Oil-Enclosed Track Release Mechanism** — Operates in oil, seals out dirt and moisture, always in working condition to provide positive protection.

*See your nearby Allis-Chalmers dealer now for the full story. Whether you're interested in a big tractor like the HD-20 or HD-15 . . . or the smaller HD-9 and HD-5, you can be sure of getting the most advanced tractor in the business, because Allis-Chalmers is the leadership line.*

**ALLIS-CHALMERS**

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



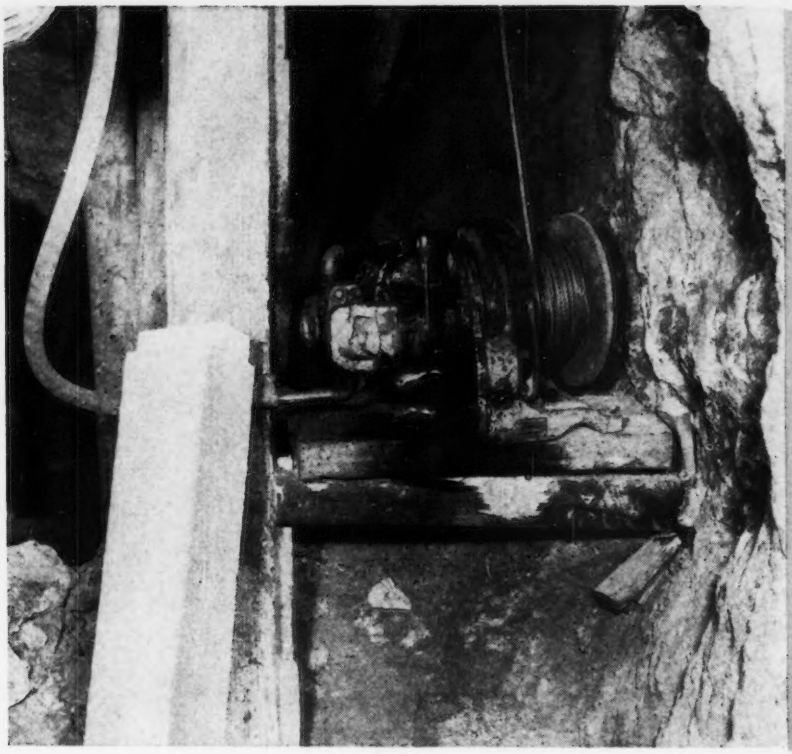

# NO COMPROMISES

All our maps are compiled with an uncompromising determination to present the magnetic data literally and exactly as observed. This one is a product of our million miles of air exploration experience. We'd like to speed your work, too.

**AERO**
**SERVICE CORPORATION**
PHILADELPHIA 20, PENNSYLVANIA
*Oldest Flying Corporation in the World*

SCINTILLATION COUNTER SURVEYS
AIRBORNE MAGNETOMETER SURVEYS
PRECISE AERIAL MOSAICS
TOPOGRAPHIC MAPS
PLANIMETRIC MAPS
RELIEF MODELS
SHORAN MAPPING

*Our affiliate is*
CANADIAN AERO SERVICE, Ltd., Ottawa



# ODD JOBS?

# ...they're a cinch

## with a JOY DW-111 HOIST

This is the portable hoist to take care of those time-consuming chores in and around the mine. With the least amount of time and effort, too, and *with maximum safety.* Lifting capacity is 1300 lbs. Rope speed, 80 ft. per minute. Power is by our reversible, 4-cylinder, 4 HP Pistonair Motor. AUTOMATIC SAFETY BRAKE holds the load in any position when throttle is in "off" position.

Other Joy multipurpose hoists—air or electric drive—with lifting capacities ranging from 500 to 3500 lbs. are available to take care of your light or heavy lifting. All models are rugged and compact, suited for rough handling underground and for operation in tight spots. Complete information on all Joy single drum hoists is in Bulletin 76-X. Write for your copy today to **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

**for AIR COMPRESSORS, ROCK DRILLS, HOISTS AND SLUSHERS**

JOY

W&D M5406

**WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT**

# CF&I steel products for the mining industry

## WICKWIRE ROPE

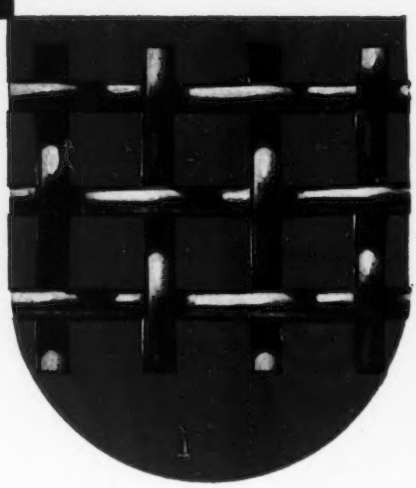
Wickwire Rope is a high-quality product recognized for over half a century for its dependability. There is a type for every application. Wickwire Rope combines toughness with fatigue resistance and will provide safety and long life.

## CAL-WIC INDUSTRIAL SCREENS

CAL-WIC Screens are fabricated in a wide range of types of the toughest steels and alloys. Whether for processing, cleaning, grading, filtering or screening, for any type of equipment, you will always get the results you need for efficient operation with CAL-WIC Screens.

## CF&I ROCK BOLTS

Here is the modern mine roof, wall and back support that means clear, safe mining with a minimum expenditure of labor and materials. Available in the Pattin expansion shell type or the slot-and-wedge type.



THE COLORADO FUEL AND IRON CORPORATION
Denver and Oakland

WICKWIRE SPENCER STEEL DIVISION
New York, New York

2609

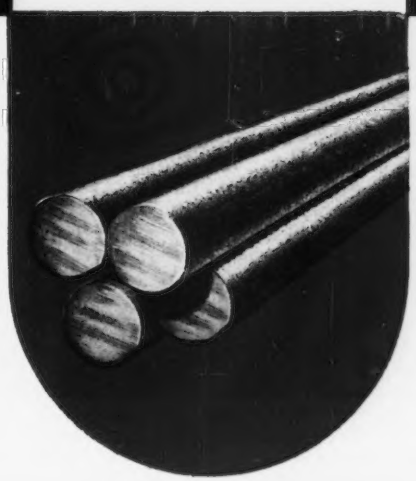
**CF&I** quality steel products for the mining industry are manufactured under the most rigid quality control. Important to you, as well, is the fact that these products are in everyday use in our own mining operations. This is an additional assurance of products made *well* and made *correctly*.

## CF&I GRINDING RODS

CF&I Grinding Rods are rolled from special analysis steel and are machine-straightened with square-cut ends to give efficient and economical grinding.

## CF&I GRINDING BALLS

Your mill will operate efficiently and economically when you use CF&I Grinding Balls. Forged from special analysis steel, CF&I Grinding Balls have the ideal balance between toughness and hardness, resulting in optimum grinding ability as well as in maximum wearability.



## CF&I MINE RAILS & ACCESSORIES

Rails are available in a range from 12 to 45 pounds and are made to A.R.A. standards. Accessories include splice bars, angle bars, spikes and track bolts and nuts—both square and hexagon.

**THE COLORADO FUEL AND IRON CORPORATION**

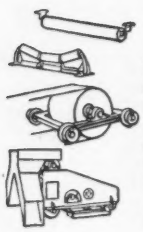
CF&I

# Carry the load via Link-Belt belt conveyors... SEE YOUR COSTS GO DOWN

**LINK-BELT offers you the "total engineering" so necessary for top efficiency**

**DESIGNED FOR OVERALL EFFICIENCY**

Because of its unrivalled experience, Link-Belt can do a better job of gathering and analyzing all data. Proposals reflect this understanding of the most practical way to fit conveyors into your overall system requirements.



**BUILT FOR LONG-LIFE PERFORMANCE**

Link-Belt manufactures all components and related feeders and conveyors. You are assured of the right equipment because of this breadth of line. And Link-Belt will supply the highest grade belts engineered to the job.

**DELIVERS FULL RATED CAPACITY**

Link-Belt follows through on every detail of the job, including electrical controls and even wiring and foundations. What's more, Link-Belt will furnish experienced erection superintendents, staffs and skilled crews if desired.

**ASSURE SATISFACTORY PERFORMANCE**

When you rely on Link-Belt as a single source for your complete system, Link-Belt accepts responsibility for placing it in full operating readiness. We will also supervise modernization of existing systems.

This extensive belt conveyor system is another example of Link-Belt's preparedness to solve bulk handling problems, either large or small.

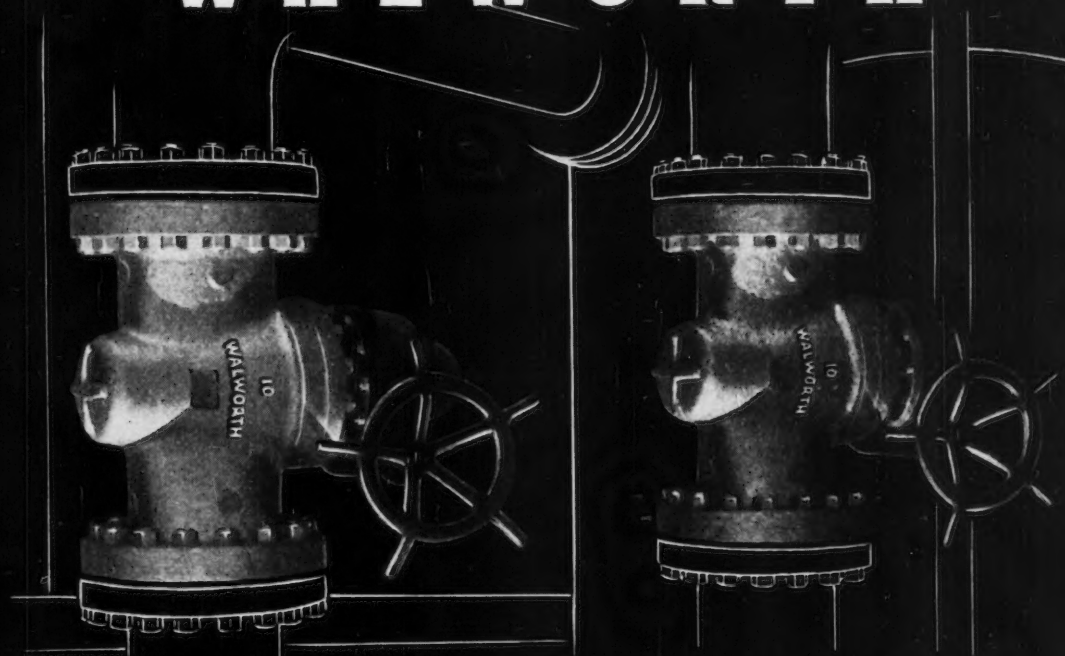
WHETHER it's a single belt conveyor or a complete system, there's no substitute for Link-Belt equipment and Link-Belt engineering. Call the district sales office near you for all the facts on this unique single-contract service.

**LINK-BELT**

**BELT CONVEYOR EQUIPMENT**

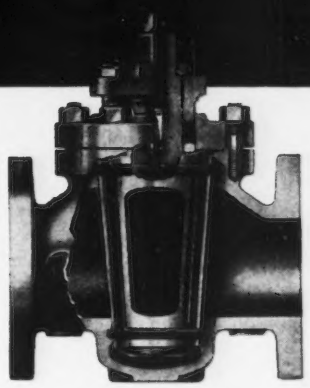
LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13.467-B

# WALWORTH




## LUBRICATED PLUG VALVES

*Better because* . . . **They are *pressure sealed* with an insoluble lubricant readily renewed while the valve is in service. Lubricant completely surrounds the plug ports assuring a tight seal against leaks. It also insures ease of operation by reducing friction between the body and the plug while at the same time protecting the finished surfaces against corrosion and wear.**



**Lubricant system of a Walworth No. 1700F Regular Gland, Wrench Operated, Steel-iron, *Lubricated Plug* Valve. Other Walworth *Lubricated Plug* Valves include Single Gland, and Ball Bearing types. Sizes to 30-inches — pressures to 5,000 psi, and for vacuum service.**

Walworth Lubricated Plug Valves are the most satisfactory valves available for the handling of gritty suspensions, and many other destructive, erosive, and corrosive industrial and chemical solutions.

They are ideal for general refinery and pipeline service.

For full information see your Walworth Distributor, or write for your copy of Bulletin 111. Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

**WALWORTH**

*Manufacturers since 1842*

**valves . . . pipe fittings . . . pipe wrenches**

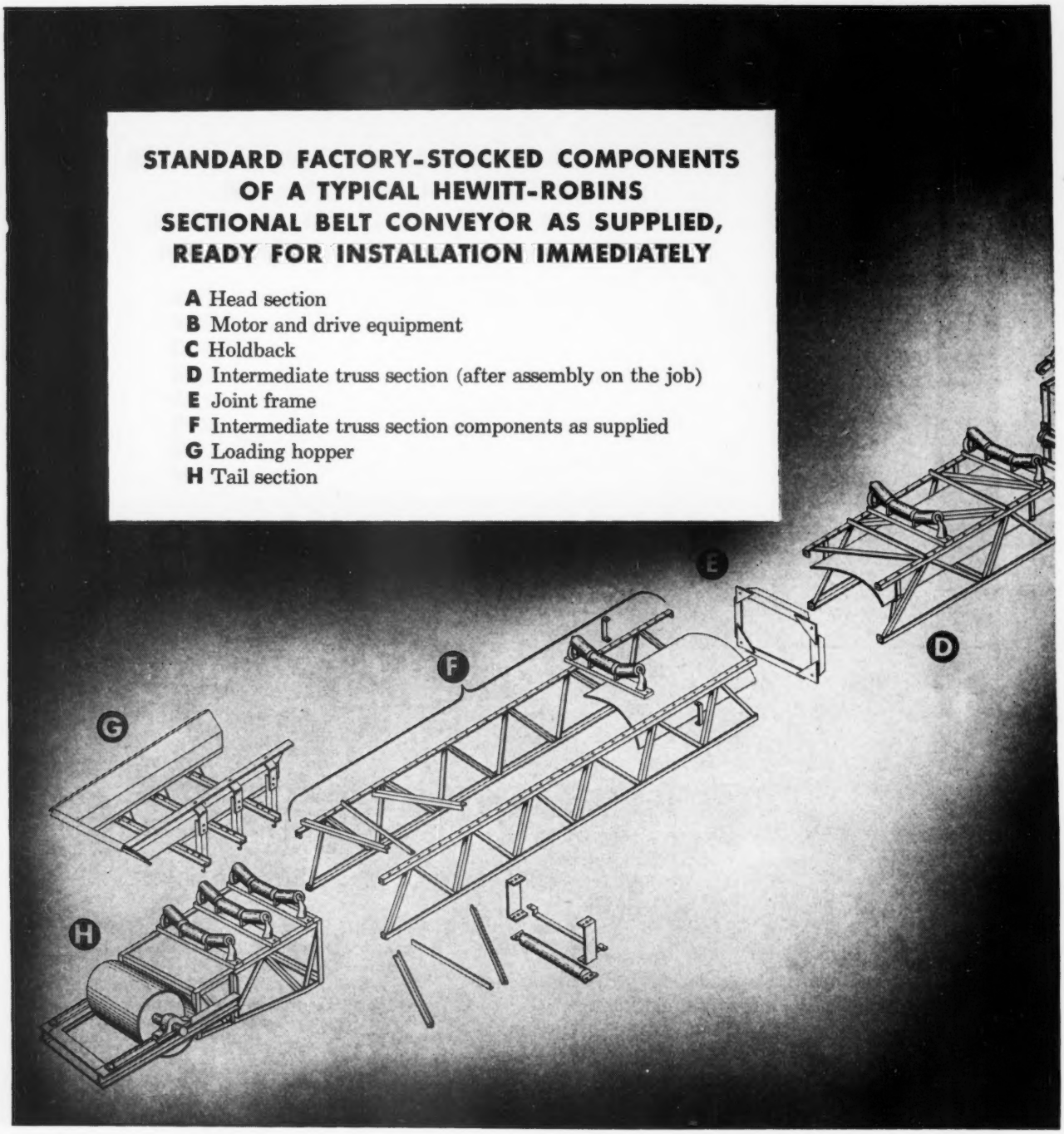
**60 East 42nd Street, New York 17, N. Y.**

**DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD**

# Order Your Belt Conveyor

**STANDARD FACTORY-STOCKED COMPONENTS OF A TYPICAL HEWITT-ROBINS SECTIONAL BELT CONVEYOR AS SUPPLIED, READY FOR INSTALLATION IMMEDIATELY**

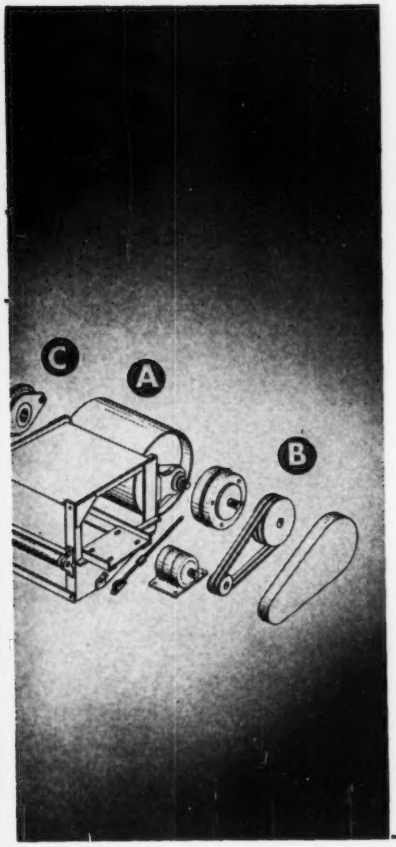
**A** Head section
**B** Motor and drive equipment
**C** Holdback
**D** Intermediate truss section (after assembly on the job)
**E** Joint frame
**F** Intermediate truss section components as supplied
**G** Loading hopper
**H** Tail section




**HEWITT-ROBINS**

**EXECUTIVE OFFICES, STAMFORD, CONNECTICUT**

# Right From Factory Stock




***Save Time and Money . . . Install your own Hewitt-Robins Sectional Belt Conveyor from Easy-to-assemble Factory-built Components***

Now, for the convenience of large and small plant operators alike—Hewitt-Robins offers a standardized sectional conveyor adaptable to a wide variety of uses.

Hewitt-Robins Sectional Conveyors consist of completely assembled factory-stocked components that can be quickly and economically installed and maintained by your own personnel.

When you order a Hewitt-Robins Sectional Conveyor you can be sure of prompt delivery . . . all components and parts from machinery to belting are shipped to you direct from standard factory stocks . . . saves you time and saves you money.

For prompt information about the Sectional Conveyor and any other Hewitt-Robins bulk material handling products, contact the Hewitt-Robins office nearest you or write direct to Passaic, New Jersey.

## ENGINEERING DATA

**APPLICATION:** Designed to handle bulk and packaged materials where special limitations and conditions do not require the use of custom-engineered belt conveyors.

**MATERIALS HANDLED:** Sand, gravel, run-of-mine ore, coke, stone, coal, gypsum, grain, sugar beets and any other bulk materials that can be handled more efficiently and economically by belt conveyor.

**CAPACITIES:** From 20 to 500 TPH at belt speeds from 200 to 450 feet per minute.

**STANDARD WIDTHS:** 18", 24", 30", 36".

**LENGTH:** From 15'6" up to any length consistent with good conveyor practice... inclines up to 22½°.

**STANDARD HORSEPOWER:** From 2 to 30 hp.

**IDLERS:** 4" or 5" diameter troughing and return idlers available. Both types have exclusive Hewitt-Robins patented Triple Grease Seal and one-shot lubrication.

**BELTING:** Complete selection of all Hewitt-Robins standard stocked belts. Special belts available when necessary.

**INSTALLATION:** All standard factory-assembled components are clearly labeled and shipped with complete instructions, for quick, easy assembly by your own personnel.

*Write for Bulletin #132-B on your company letterhead*

*Here is a partial list of*
**HEWITT-ROBINS PRODUCTS**
*that will help you cut handling costs and increase operating efficiency*

**MACHINERY:**

Belt Conveyors
Belt & Bucket Elevators
Car Shakeouts
Screen Cloth
Vibrating Conveyors & Screens

**INDUSTRIAL RUBBER PRODUCTS:**

BELTING:
Conveyor
Elevator
Transmission

HOSE:
Hewitt-Robins makes over 1,000 different types of industrial rubber hose, including Twin-Weld®, the patented twin-line welding hose.

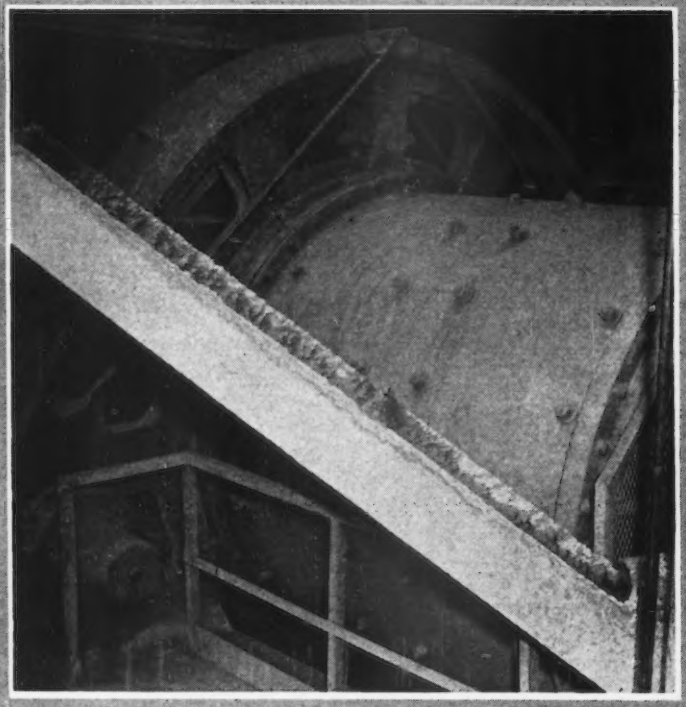
*For information and service on industrial rubber products, contact your Hewitt-Robins Industrial Supply Distributor. Through his complete stock of Hewitt-Robins Rubber Products, and his familiarity with local field conditions, he can fill your supply needs promptly and correctly. See Classified Phone Book for the Hewitt-Robins Industrial Supply Distributor serving your area.*

3081

# INCORPORATED

**DOMESTIC DIVISIONS:** Hewitt Rubber • Robins Conveyors • Robins Engineers • Restfoam
**FOREIGN SUBSIDIARIES:** Hewitt-Robins (Canada) Ltd., Montreal • Hewitt-Robins Internationale, Paris, France • Robins Conveyors (S. A.) Ltd., Johannesburg • **EXPORT DEPARTMENT:** New York City.

# there are no MARCY MILL orphans



**MARCY 86 BALL MILL... BUILT IN 1915...STILL WORKING 24 HOURS PER DAY AFTER 40 YEARS OF DEPENDABLE MECHANICAL OPERATION... M & S SUPPLIES QUALITY REPLACEMENT PARTS WHICH FIT ACCURATELY — FROM ORIGINAL DRAWINGS AND TEMPLATES.**

## You can ALWAYS get replacement parts that fit YOUR mill

When you buy a Marcy* Grate Discharge Ball Mill or a Marcy Open End Rod Mill you get a mill which is recognized as the leader in low-cost-per-ton output resulting from efficient, dependable mechanical and metallurgical performance—proved by the fact that so many successful mining companies continue to order and reorder Marcy Mills.

And, you are assured of always being able to get the same high quality replacement parts to *accurately fit your mill.* Templates and drawings are available for every Marcy Mill.

**Both Marcy and Massco are registered trademarks.*

***Licensed Manufacturers and Sales Representatives:***
Canadian Vickers, Ltd., Montreal, Canada
The Austral Otis Eng. Co., Ltd., So. Melbourne, Austr.
Morgardshammers Mek. Verkstads Aktiebolag, Mogardshammar, Sweden
Pegson Limited (for England & Africa) Coalville, Leicestershire, England

***Sales Agents:***
W. R. Judson, Santiago, Chile
The Edward J. Nell Co., Manila, P. I.
The Ore & Chemical Corporation, 80 Broad Street, New York City 4, New York
*Representatives for Continental Europe*

The Mine & Smelter Supply Co.
DENVER 17, COLORADO
Offices in Salt Lake City, El Paso, 1775 Broadway, N. Y. C.

# IF your present conveyors aren't doing a PERFECT job—

## INVESTIGATE this amazing NEW CONVEYOR!

IF your product is too hot, sharp or oily for belt or flight conveying, or too abrasive or sticky for screw or apron conveying — if you're getting excessive spillage, if you have cleaning problems, or any other conveying difficulties — *you owe it to yourself to investigate the Carrier Natural-Frequency Conveyor.*

These revolutionary conveyors are an entirely new *type* of vibrating equipment which substitutes Natural-Frequency spring action for brute force. Where "brute-force" conveyors may use up to 90% of their power to operate their moving parts and only about 10% to convey their loads, *the Natural-Frequency Conveyor uses substantially no more power to operate, empty, than is required to run the motor alone.*

### CARRIER ADVANTAGES

**HIGH CONVEYING SPEED**
(Up to 100 feet per minute)

**GREATER CAPACITY**
(Up to 200 tons per hour)

**LESS POWER REQUIRED**
(About one-third as much as "competitive" equipment)

**LESS MAINTENANCE & DOWN-TIME**
(Less power + good design = trouble-free performance)

**NO DAMPENING UNDER LOAD**
(Designed with extra power for specified load, with positive stroke)

**SELF-CLEANING**
(Continuous, smooth trough — no pockets)

**COMBINES PROCESSING WITH CONVEYING**
(Can screen, dry, cool, dewater, blend, etc.)

**WIDTHS FROM 6" TO 48"—LENGTHS FROM 5' TO 250'**
(With pans 16 ga to ½" plate, of any metal, open or enclosed)

**BALANCED, VIBRATION-FREE UNITS AVAILABLE**
(For use on ceilings or light floor construction)

## CARRIER ~~NATURAL-FREQUENCY~~ CONVEYORS

Carrier Conveyor Corporation
2132 Frankfort Avenue, Louisville 6, Kentucky

Gentlemen:

Without obligation, please send me Carrier Natural-Frequency Conveyor Bulletin No. 111

Firm_____

Street_____

City_____ State_____

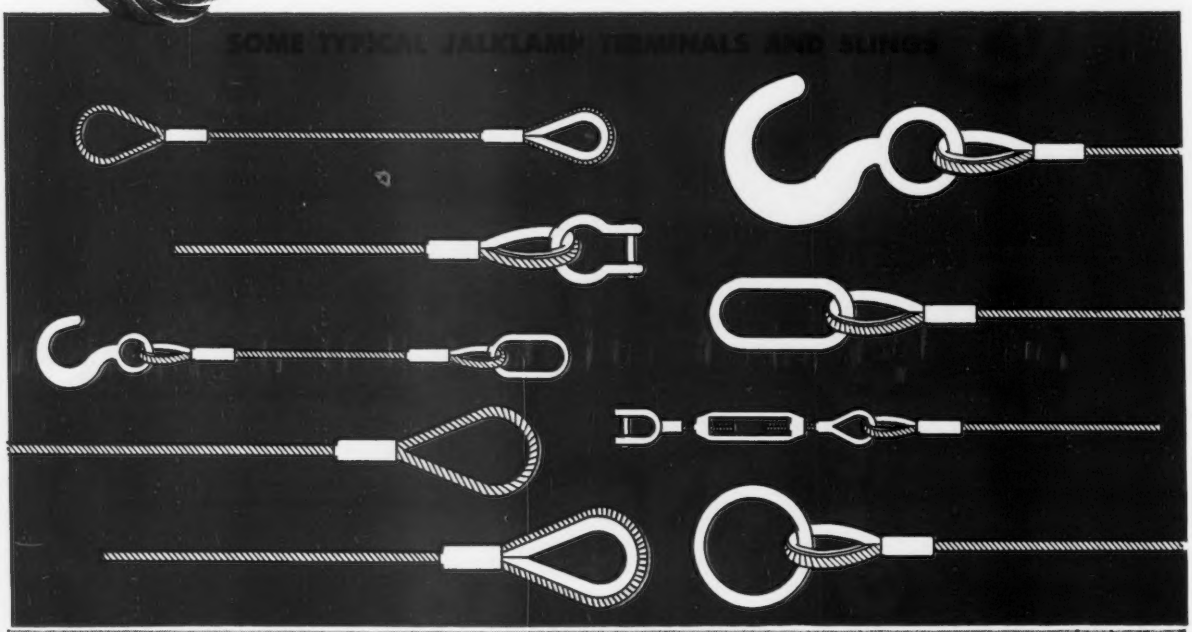
Att. Mr._____ Dept._____

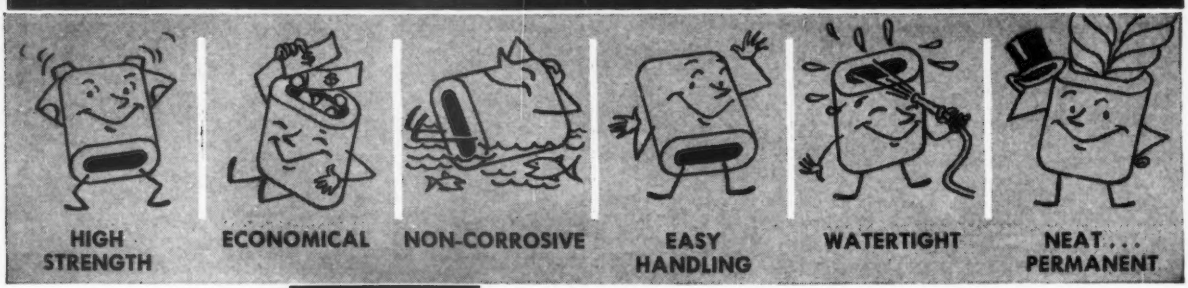
# END YOUR SPLICING PROBLEMS WITH J&L JalKlamp SLINGS AND TERMINALS

Now, thanks to JalKlamps, you can order J&L Wire Rope with terminal splices which afford unsurpassed strength, corrosion resistance, safety and ease of handling. *And JalKlamp Terminals cost far less than you would spend to do the job yourself with conventional tucked splices.*

J&L JalKlamps are new non-corrosive special alloy sleeves with tremendous strength and unique cold forming characteristics. When squeezed around wire rope by a special hydraulic press, the JalKlamp metal "flows" into the spaces between the wires in the strands and the strands themselves, producing a neat, homogeneous splice.

Take advantage of the extra economy . . . long service life offered by J&L JalKlamps. You can get J&L Wire Rope Terminals and Slings spliced with JalKlamps in all standard constructions, and in diameters from ⅛″ to 2″ with these centers—SpringKore, PlastiKore, Fibre Core and IWRC.



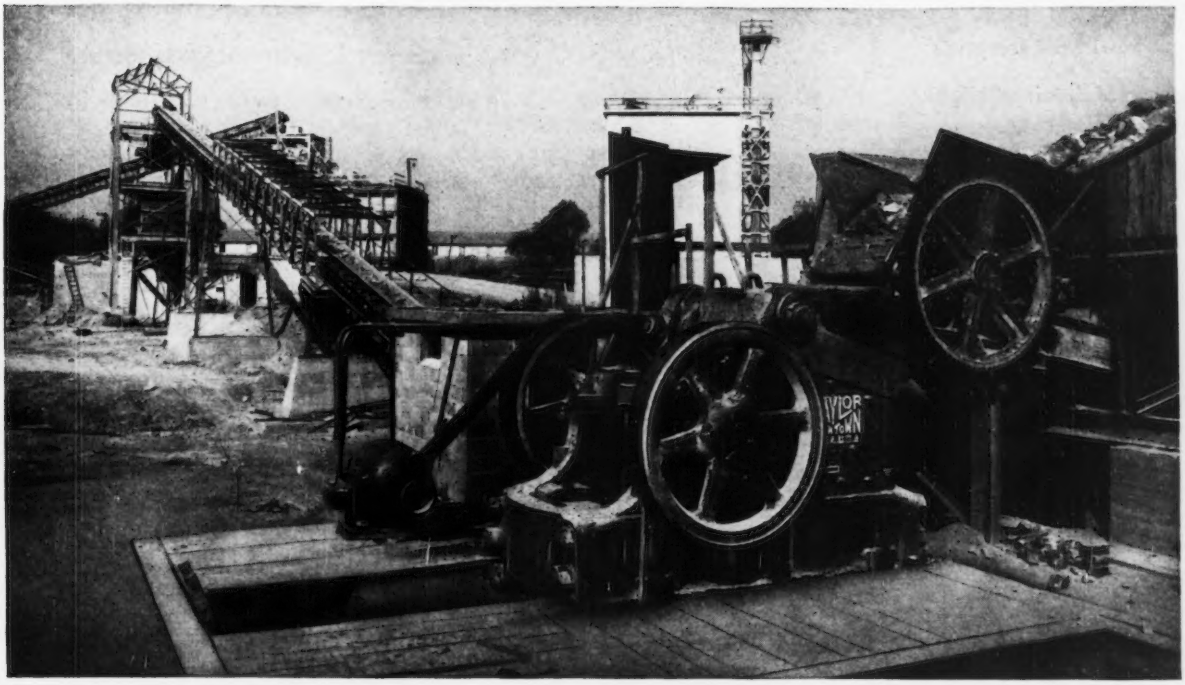



J&L STEEL

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

# it's not what you put into a Traylor "R" Crusher that counts ...it's what you get out that

# pays off



**TRAYLOR ENGINEERING & MANUFACTURING CO.**
**1602 MILL ST., ALLENTOWN, PA.**
SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

I'd like to know more about the Traylor Type "R" Crusher and its pay-off in increased production.

*Name* _____

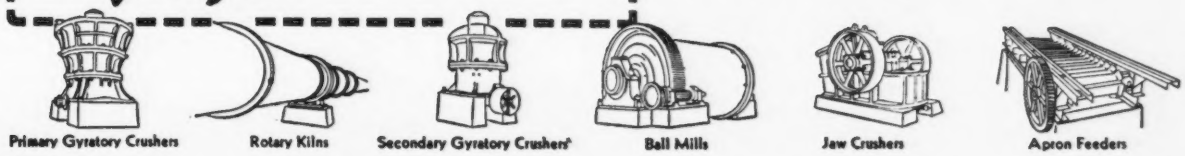
*Company* _____

*Address* _____

*I am crushing* _____ *tons per hour with a* _____ *crusher.*

a **Traylor** *leads to greater profits*

Today, the initial cost of a machine is not the deciding factor in its installation. Production potential is the prime consideration. A Type "R" Jaw Crusher is "Traylor-Made" to make money for its operator. With feed openings from 36″ x 48″ to 48″ x 60″, a Type "R" Traylor Crusher can produce 130 to 550 tons per hour of 2″ to 9″ product. The main reason for the Type "R's" amazingly high rate of production is its original Traylor Curved Jaw Plates. The several ways in which Traylor curved jaw plates lower production costs are clearly described in Bulletin 1123. Mail coupon for your copy today.



Primary Gyratory Crushers | Rotary Kilns | Secondary Gyratory Crushers | Ball Mills | Jaw Crushers | Apron Feeders

# WILFLEY PUMPS

## Reduce Pumping Costs...Increase Production

**Minimum downtime required for replacement of parts**

**Continuous operation without attention**

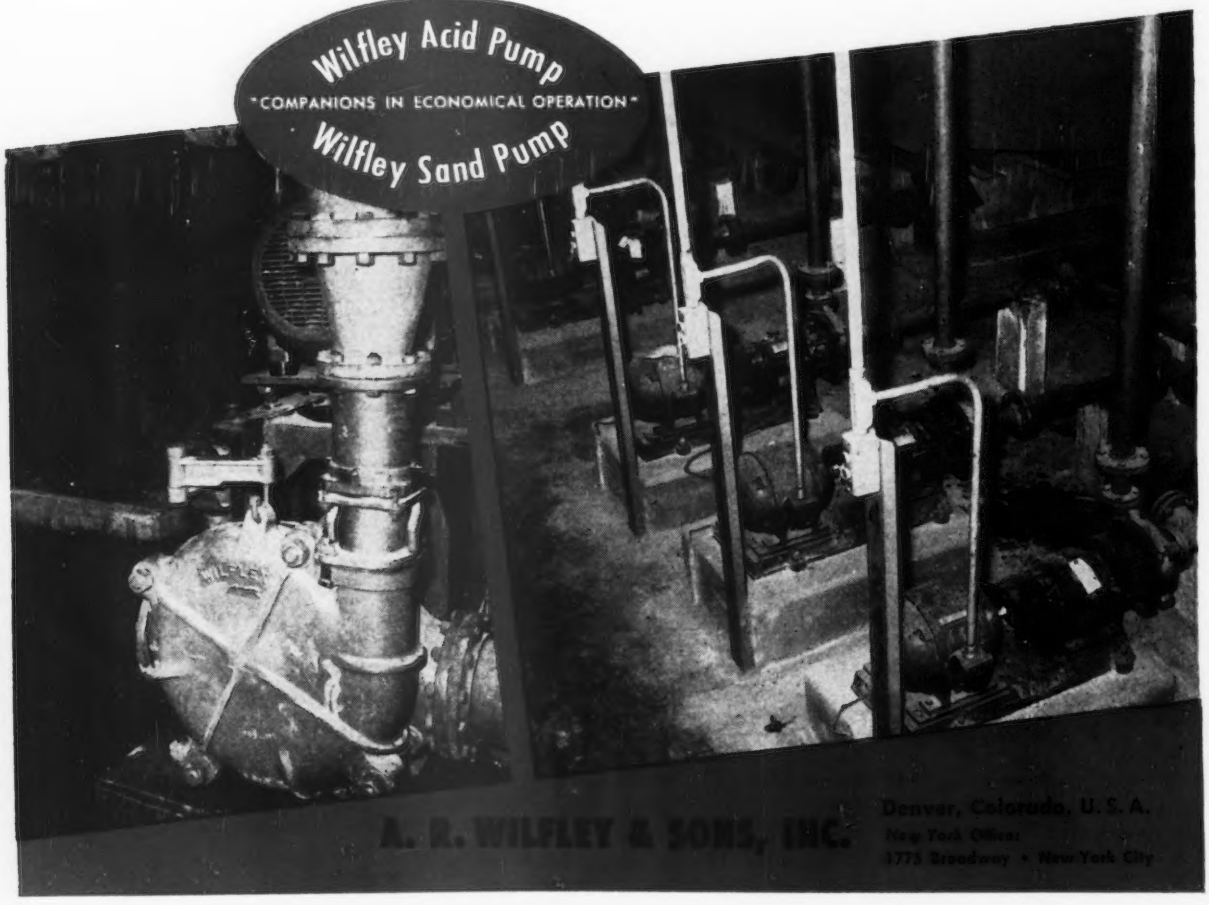
**Maintained High Efficiency**

**Economical pump for every requirement**

*Individual engineering on every application. Write, wire or phone for complete details.*

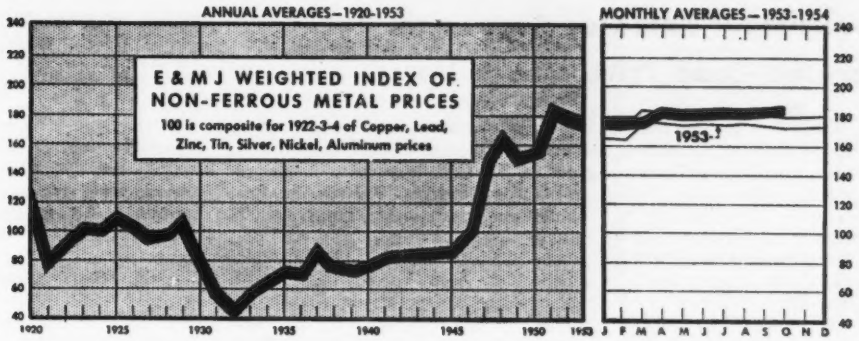
Wilfley's remarkable success-record in creating substantial dollar savings in power and maintenance means low-cost production on every pumping job. This cost-saving efficiency is born of engineering "know-how" plus many years of experience in keeping pace with the changing requirements of modern industry.

**Shown here are typical Wilfley installations. Rubber lining, alloy irons, plastics and stainless steel are some of the materials used in Wilfley Sand Pumps and Acid Pumps to provide maximum pumping efficiency.**


Wilfley Acid Pump
"COMPANIONS IN ECONOMICAL OPERATION"
Wilfley Sand Pump
A. R. WILFLEY & SONS, INC.
Denver, Colorado, U. S. A.
New York Office:
1775 Broadway • New York City

# E&MJ OUTLOOK

## PRICES


ANNUAL AVERAGES—1920-1953
E & M J WEIGHTED INDEX OF NON-FERROUS METAL PRICES
100 is composite for 1922-3-4 of Copper, Lead, Zinc, Tin, Silver, Nickel, Aluminum prices
MONTHLY AVERAGES—1953-1954
1953-4
J F M A M J J A S O N D

## MARKETS

**Strength in lead** had most to do with pushing the *E&MJ* index of non-ferrous metal prices to 187.50 for October, against 186.56 for September and 180.05 for October a year ago.

**With sales of foreign copper** reported as high as 36c per lb, the copper market is still strong. With mines working again, supplies should pick up shortly, but demand will outrun supply until well into next year.

**Lead and zinc,** both steady at present price levels, owe their strength to Government stockpiling. There's been no move to force foreign metal on the domestic market. Conversely, enough metal is available to prevent any great further upward pressure on prices.

**Steadier markets and good demand** were in prospect for most metals as October ended.

●

## LABOR

**The heat is on Maurice Travis,** Mine, Mill and Smelterworkers union leader, on charges of falsely signing a non-Communist affidavit in order to get bargaining rights for his union. Mine, Mill's leaders are desperate; they fought bitterly at Butte, not so much for a big wage boost as to get the International named as bargaining agent, thus tightening their grip on the local unions.

●

## AT HOME

**The outlook for 1955** is greatly strengthened by two developments:

**1.** Business (according to the annual survey conducted by the McGraw-Hill Department of Economics) plans to invest in new plant and equipment at only slightly below the 1954 level.

**2.** The upsurge in new housing starts bids fair to continue strongly into 1955.

**Renewed growth in the economy** seems, therefore, to depend on consumer spending, which might well pick up in the next month. Right now, it's running high, but is not increasing.

**The climbing steel rate** is a good omen. Note that earlier forecasts of a 1955 consumption of around 96-million tons of steel ingots would call for use of about 77% of the industry's capacity. The rate's nearly that now.

●

## ABROAD

**There will be plenty of zinc.** American Metal Co. has been drilling an orebody in New Brunswick which shows three-million tons of ore averaging 10½% zinc, 4½% lead, ½% copper; and some gold and silver. These data pertain to a small fraction of the company's claims in the area. International Nickel holds 25%. Drilling has been going on for about 4 months. Airborne prospecting indicates much metal in the rest of the company's claims.

# MARKETS—Trends and Prices

## U. S. Government Releases Copper to Ease Shortage—Lead Price Moves Up

**INDUSTRIAL ACTIVITY** continued about unchanged in October, according to *E&MJ* estimates. The Federal Reserve Board's index is expected to show 124% of the 1947-'49 average when final figures are in. It has been at this level since Spring, except for July when the Board's seasonally adjusted figure dropped to 123.

The steel rate picked up somewhat in October, and with automobile production to increase now that the new models are coming out, the index ought to rise a point or two in November. But this assumes other things will not go into reverse.

**GATT,** which means General Agreement on Tariffs and Trade, began its ninth session in Geneva on Oct. 28. There is much concern about this session, expected to extend into 1955. Many observers believe these meetings will determine whether GATT will come out with a permanent organization and the possibility of bringing order into the chaotic condition of world trade, or will fold its wings. Those in favor of higher tariffs and greater restrictions on foreign trade are of course hoping for the latter. On Nov. 8 the 34 member countries, including Czechoslovakia, the only Iron Curtain country in GATT, will begin revising the system set up in 1947.

The economically more important countries, including the U.S., U.K., West Germany, France, and the Netherlands will apparently work toward freer trade. Most other countries' representatives believe that world consumption, which is so often presumed to be the only object of production, can be increased by each country trading its surplus for the surplus of other countries. Some of the "underdeveloped" countries may seek greater limits on GATT. They contend that they cannot develop new industries, especially in manufacturing, because costs are too high for the first few years—they claim protection is necessary until the new industries have acquired skilled workers and efficient management.

**Copper consumers** in the U.S. were much concerned about the shortage of that metal brought on by a number of work stoppages. The 46-day strike at Anaconda's Montana mines and plants was ended in the second week of October. The unions and management also reached agreement at AS&R's smelter at Garfield, Utah and at Kennecott's refinery, same place. The world loss of copper is estimated at about 70,000 tons.

The U.S. Government came through with 26,500 tons of copper for consumers in the U.S. Scarcity of required shapes gave some consumers trouble—wire makers are reported to have turned down offers of cathodes. Copper may still be short in the U.S. in November, according to some reports. The Government will let consumers have another 25,000 tons in November.

The Chilean Finance Commission, which had been considering various measures to incorporate into a copper bill, is reported to have finally sent one to the Chamber of Deputies. Reports suggest the major companies will have to pay a base tax of 50% of profit, plus an additional tax which will range from 25% of profit if output is equal to the average for a recent number of years, to zero if production gets up to about a million tons. The companies may also be required to make a minimum annual investment in the country. Much of what may be good or bad could be offset by whatever peso-dollar exchange rates are set.

**The copper price policy** of U.S. producers appears to be one of maintaining stability. There was no indication of a possible departure from the 30c delivered level. On the London Metal Exchange copper continued to flop about, sometimes jumping or falling with no contracts being sold. On Oct. 5, first session, prompt copper went to £305 bid and £310 asked (about 39c per pound); on the 7th it was down £20; up £10 on the 8th. It reached its October low for prompt on the 18th at £257½ and £260. The backwardation reached more than £20. Copper prices outside the U.S. generally reflected the shortage.

**Prices of major non-ferrous metals** in October were firm. U.S. Government purchase of lead and zinc are considered responsible for the present prices of 15c N.Y., and 11½c East St. Louis. The strengthening of lead in October pushed the *E&MJ* metal price index up to 187.50 from 186.56.

**Lead** was moved up on Oct. 4 to 15c per pound N.Y. by a major custom smelter. However, much more metal was sold at lower prices for several days, so it was not until Oct. 6 that the *E&MJ* price settled at 15c. The "old" East St. Louis price of lead (14.550c) held right up to Oct. 6. Reports are that with the U.S. Government prepared to buy almost half of U.S. mine production, sales by the various companies in the U.S. market are likely to be uneven, leaving some with very little metal while others have heavy stocks. On a price rise the firms with heavy stocks can liquidate by selling at the low price.

U.S. producers were concerned when the Government failed to come into the market for lead when it requested zinc offers. Many thought the Government was not interested in 15c lead but when it did come in, observers decided the 15c price was assured.

In the U.S. producers' shipments for September were 30,871 short tons.

On the London Metal Exchange prompt lead reached its maximum for the month; first session, of £111¼ asked and £111½ bid on Oct. 6. This is the equivalent of almost 16c N.Y., when duty and freight are added.

**Zinc** remained firm at 11.50c St. Louis throughout October, thanks to U.S. Government buying. There were reports that some major producers sold less to the Government than had been expected. No firm wants to turn down non-Government consumers in order to sell to the stockpile.

**Platinum** showed distinct signs of weakness. Some wholesalers continued to get $84 per oz troy, but producers' prices

### Average Prices for September (E&MJ Quotations)

| | |
|---|---|
| **Copper:** | |
| Electrolytic, domestic, refinery | 29.700 |
| Electrolytic, export, refinery | 31.529 |
| **Lead:** | |
| Common, New York | 14.965 |
| Common, St. Louis | 14.760 |
| **Silver and sterling exchange:** | |
| Silver, New York, per oz. | 85.250 |
| Silver, London, pence per oz. | 74.107 |
| Sterling Exchange, "Checks" | 279.747 |
| **Zinc:** | |
| Prime Western, East St. Louis | 11.500 |
| Prime Western, delivered (g) | 12.000 |
| **Tin:** | |
| New York Straits | 93.055 |
| New York, 99% min. (e) | 92.055 |
| **Gold,** per oz. U.S. price | $35.000 |
| **Quicksilver,** per flask | $325.000 |
| **Antimony** (E&MJ) (d) | 31.970 |
| **Antimony,** bulk, Laredo | 28.500 |
| **Antimony,** in cases, Laredo | 29.000 |
| **Platinum** refined, per oz. | $79.800 |
| **Cadmium** (a) | 170.000 |
| **Cadmium** (b) | 170.000 |
| **Cadmium** (c) | 170.000 |
| **Aluminum,** 99% plus, ingot | 22.200 |
| **Magnesium,** ingot | 27.000 |
| **Nickel** (f) | 60.000 |

**Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lb.**

**(a) Cadmium average based on the producers' quotations.**

**(b) Cadmium average based on the average of the producers' and platers' quotation.**

**(c) Cadmium average based on platers' quotation.**

**(d) Domestic, 5 tons or more but less than carload lots, packed in cases f.o.b. New York.**

**(e) Tin content.**

**(f) F.o.b. Port Colborne, U.S. duty included.**

**(g) Delivered where freight exceeds 0.5c.**

*Markets Continued on Page 106*

were several dollars under this. There were reports of sales by producers at under $80. Late in the month some producers said they were offered $77 per oz.

**Quicksilver** continued through October at $325 per flask N.Y. Business was not active. Consumers appeared to be biding their time; some factors claimed that metal was so scarce in the U.S. that if the consumers did come in the price would be pushed up again. There are still stories of Spanish mercury on its way to the U.S. market.

**Aluminum** production in September in the U.S. was 120,332 short tons.

## "Free" Gold Market

Prices for gold in the "free" market moved within narrow limits during October. There was a pronounced decline of coin prices in most trading centers. Russian sales of gold are reported to have taken place again during October. A small shipment, about ten tons, was sold against Sterling. Trading volume in all markets declined about 6%. Pick's World Currency Report quotes on "free" gold per fine oz, as follows:

| | COINS | | BARS (12.5 kg) | |
|---|---|---|---|---|
| | Sept. 30 | Oct. 29 | Sept. 30 | Oct. 29 |
| NEW YORK, transit | ..... | ..... | $35.10 | $35 10 |
| MANILA | $41.25 | $41.00 | 38.10 | 38.25 |
| HONG KONG | 41.00 | 40.75 | 38.05 | 38.25 |
| BOMBAY | 48.50 | 48.75 | 47.75 | 48.25 |
| TANGIER | 41.50 | 40.75 | 35.05 | 35.05 |
| BEYROUTH | 42.25 | 41.50 | 32.25 | 35.25 |
| PARIS | 41 85 | 40.60 | 35.85 | 35.75 |
| BUENOS AIRES | 41.30 | 41.00 | 38.25 | 38.00 |

Note: All prices are computed at the free or black market value of the U. S. dollar in the local markets.

## Major Metals

### U. S. DAILY AND AVERAGE PRICES

| Oct. 1954 | Electrolytic Copper (a) Domestic | (b) Export | Straits Tin New York | Lead New York | Lead St. Louis | Zinc Delivered (f) | Zinc East St. Louis |
|---|---|---|---|---|---|---|---|
| 1 | 29.700 | 31.175 | 93.250 | 14.750 | 14.550 | 12.000 | 11.500 |
| 2 | No Market | 31.075 | 93.250 | 14.750 | 14.550 | 12.000 | 11.500 |
| 4 | 29.700 | 31.825 | 93.250 | 14.775 | 14.550 | 12.000 | 11.500 |
| 5 | 29.700 | 32.350 | 94.750 | 14.850 | 14.550 | 12.000 | 11.500 |
| 6 | 29.700 | 31.100 | 93.250 | 15.000 | 14.800 | 12.000 | 11.500 |
| 7 | 29.700 | 30.725 | 93.375 | 15.000 | 14.800 | 12.000 | 11.500 |
| 8 | 29.700 | 32.825 | 93.625 | 15.000 | 14.800 | 12.000 | 11.500 |
| 9 | No Market | 31.375 | 93.625 | 15.000 | 14.800 | 12.000 | 11.500 |
| 11 | 29.700 | 31.000 | 93.375 | 15.000 | 14.800 | 12.000 | 11.500 |
| 12 | Holiday | 31.700 | Holiday | Holiday | Holiday | Holiday | Holiday |
| 13 | 29.700 | 30.250 | 93.375 | 15.000 | 14.800 | 12.000 | 11.500 |
| 14 | 29.700 | 30.775 | 93.250 | 15.000 | 14.800 | 12.000 | 11.500 |
| 15 | 29.700 | 30.500 | 93.000 | 15.000 | 14.800 | 12.000 | 11.500 |
| 16 | No Market | 30.500 | 93.000 | 15.000 | 14.800 | 12.000 | 11.500 |
| 18 | 29.700 | 30.800 | 93.000 | 15.000 | 14.800 | 12.000 | 11.500 |
| 19 | 29.700 | 30.800 | 92.875 | 15.000 | 14.800 | 12.000 | 11.500 |
| 20 | 29.700 | 30.350 | 92.875 | 15.000 | 14.800 | 12.000 | 11.500 |
| 21 | 29.700 | 31.775 | 93.125 | 15.000 | 14.800 | 12.000 | 11.500 |
| 22 | 29.700 | 30.300 | 92.875 | 15.000 | 14.800 | 12.000 | 11.500 |
| 23 | No Market | 31.300 | 92.875 | 15.000 | 14.800 | 12.000 | 11.500 |
| 25 | 29.700 | 31.425 | 92.750 | 15.000 | 14.800 | 12.000 | 11.500 |
| 26 | 29.700 | 32.375 | 92.500 | 15.000 | 14.800 | 12.000 | 11.500 |
| 27 | 29.700 | 33.125 | 92.375 | 15.000 | 14.800 | 12.000 | 11.500 |
| 28 | 29.700 | 31.125 | 92.250 | 15.000 | 14.800 | 12.000 | 11.500 |
| 29 | 29.700 | 34.175 | 92.250 | 15.000 | 14.800 | 12.000 | 11.500 |
| 30 | No Market | 35.025 | 92.250 | 15.000 | 14.800 | 12.000 | 11.500 |
| **AVERAGES FOR MONTH** | | | | | | | |
| Oct. | 29.700 | 31.529 | 93.055 | 14.965 | 14.760 | 12.000 | 11.500 |
| **AVERAGES FOR WEEK** | | | | | | | |
| Oct. | | | | | | | |
| 6 | 29.700 | 31.475 | 93.563 | 14.813 | 14.592 | 12.000 | 11.500 |
| 13 | 29.700 | 31.313 | 93.475 | 15.000 | 14.800 | 12.000 | 11.500 |
| 20 | 29.700 | 30.621 | 93.000 | 15.000 | 14.800 | 12.000 | 11.500 |
| 27 | 29.700 | 31.717 | 92.750 | 15.000 | 14.800 | 12.000 | 11.500 |
| **CALENDAR WEEK AVERAGES** | | | | | | | |
| Oct. | | | | | | | |
| 2 | 29.700 | 31.117 | 93.417 | 14.750 | 14.550 | 12.000 | 11.500 |
| 9 | 29.700 | 31.700 | 93.646 | 14.938 | 14.717 | 12.000 | 11.500 |
| 16 | 29.700 | 30.788 | 93.200 | 15.000 | 14.800 | 12.000 | 11.500 |
| 23 | 29.700 | 30.888 | 92.938 | 15.000 | 14.800 | 12.000 | 11.500 |
| 30 | 29.700 | 32.875 | 92.396 | 15.000 | 14.800 | 12.000 | 11.500 |

## Silver, Gold and Sterling

### DAILY AND AVERAGE PRICES

| Oct. 1954 | Sterling Exchange "Checks" | Silver (c) New York | Silver (c) London | Gold London | Gold (d) United States |
|---|---|---|---|---|---|
| 1 | 279.8750 | 85.250 | 73.500d. | 250s. 9d. | $35.00 |
| 2 | (e) | (e) | (e) | (e) | 35.00 |
| 4 | 280.0000 | 85.250 | 73.750d. | 250s. 8d. | 35.00 |
| 5 | 280.0625 | 85.250 | 73.750d. | 250s. 6½d. | 35.00 |
| 6 | 280.0625 | 85.250 | 73.750d. | 250s. 6½d. | 35.00 |
| 7 | 279.8750 | 85.250 | 73.750d. | 250s. 5d. | 35.00 |
| 8 | 279.8750 | 85.250 | 73.875d. | 250s. 7½d. | 35.00 |
| 9 | (e) | (e) | (e) | (e) | 35.00 |
| 11 | 279.6876 | 85.250 | 73.875d. | 250s. 8d. | 35.00 |
| 12 | Holiday | Holiday | 73.875d. | 250s. 9d. | Holiday |
| 13 | 279.6250 | 85.250 | 73.875d. | 250s. 10½d. | 35.00 |
| 14 | 279.2500 | 85.250 | 74.125d. | 251s. 0d. | 35.00 |
| 15 | 279.5000 | 85.250 | 74.375d. | 251s. 2½d. | 35.00 |
| 16 | (e) | (e) | (e) | (e) | 35.00 |
| 18 | 279.4375 | 85.250 | 74.375d. | 251s. 3d. | 35.00 |
| 19 | 279.5625 | 85.250 | 74.375d. | 251s. 1d. | 35.00 |
| 20 | 279.8750 | 85.250 | 74.375d. | 250s. 10½d. | 35.00 |
| 21 | 279.6875 | 85.250 | 74.375d. | 250s. 9d. | 35.00 |
| 22 | 279.6875 | 85.250 | 74.375d. | 250s. 10d. | 35.00 |
| 23 | (e) | (e) | (e) | (e) | 35.00 |
| 25 | 279.7500 | 85.250 | 74.375d. | 250s. 10½d. | 35.00 |
| 26 | 279.7500 | 85.250 | 74.375d. | 250s. 10d. | 35.00 |
| 27 | 279.7500 | 85.250 | 74.375d. | 250s. 10d. | 35.00 |
| 28 | 279.7500 | 85.250 | 74.375d. | 250s. 10d. | 35.00 |
| 29 | 279.8750 | 85.250 | 74.375d. | 250s. 10d. | 35.00 |
| 30 | (e) | (e) | (e) | (e) | 35.00 |
| **AVERAGES FOR MONTH** | | | | | |
| Oct. | 279.747 | 85.250 | 74.107 | — | — |
| **AVERAGES FOR WEEK** | | | | | |
| Oct. | | | | | |
| 6 | 279.938 | 85.250 | — | — | — |
| 13 | 279.766 | 85.250 | — | — | — |
| 20 | 279.525 | 85.250 | — | — | — |
| 27 | 279.725 | 85.250 | — | — | — |

Calendar Week Averages, New York Silver: Oct. 2nd, 85.250; 9th, 85.250; 16th, 85.250; 23rd, 85.250; 30th, 85.250.
(e) No market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c per pound, the average differential for delivery charges.

(b) Our "export" quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c for lighterage, etc., to arrive at the f.o.b refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c to 0.15c per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East, Middle West, and West, effective Jan. 1, 1951, commanded a premium of 1.35c per pound over the current market for Prime Western; Special High Grade 1.50c.

(f) Prime Western delivered where freight from E. St. Louis exceeds one-half cent.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, as reported daily by regular suppliers, and is usually one quarter-cent below the price paid for such bar silver, this deduction being the allowance to such suppliers for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5 per troy ounce 1000 fine, effective July 1, 1946. London silver is pence per troy ounce, basis .999 fine.

(d) U.S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

# Behind the By-Lines...

G. P. Lutjen

**One of these days** you're going to take a close look at your underground roster and midway between "Foremen" and "Hod Carriers," find "Gunner's Mates." This is because the use of artillery in mine, pit or quarry can save you many kopeks. On page 93 there's a beautiful example of how one quarry reduced the cost of removing hang-ups from $85 to $9.50 per hang-up, which certainly shoots the bottom out of the hang-up market. And a good thing too! For besides causing fatal and other aggravating injuries, a well-aimed hang-up in the 2-ton class can put some very unsightly dents in your heavy equipment.

**For sulphide fanciers this month,** we have an extremely important article by Prof. A. W. Schlechten who does his professing at Missouri School of Mines and Metallurgy in Rolla. "How Sulphide Volatilization Can Be Used in Metallurgy" shows how modern fluid-bed roasters now make it possible to apply the principles of sulphide volatilization in recovery and separation of sulphides. On page 81 you will find the information that will bring you up to date on this development and probably shed some light on your own smelter problems.

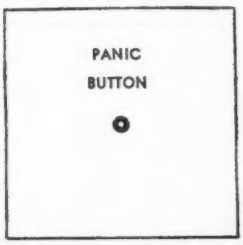
**By now everybody has heard the story** of the inveterate horseplayer who was heard to remark to a friend on the way to the track, "I hope I break even today; I need the money."

We only mention this because on page 90 H. M. Callaway's article "Basic Break-Even Formulas Devised To Simplify Mine Evaluation" presents a number of break-even formulas which do a splendid job of getting to the basic facts of mine evaluation, and it occurred to us that with a little adjusting—a wrench here, a hammer there—perhaps one of Mr. Callaway's formulas might prove helpful at the $2 window. After careful study we find that while a break-even point is a good reference for analyzing the economics of mining, it would ruin horse racing no matter how easy this article makes the calculation.

**Technical men and scientists with a yen** for globe-trotting should have a banner year in 1955. We have just received from Washington, the "List of International and Foreign Scientific and Technical Meetings," a highly official-type document listing dozens of these clambakes. It looks to us like any reasonably accomplished engineer who owns a nylon shirt and a toothbrush could romp around Europe all summer on the fat end of his income tax deductions. For instance, you could start with the Second International Seaweed Symposium in Oslo and then infiltrate Russia for the Sixth International Whaling Congress on July 18 in Moscow—non-capitalists welcome. And as long as you're in the neighborhood, you wouldn't want to miss the Sixth International Congress of Anatomy, July 25-30. In Paris—where else?

Unfortunately, the only meeting which we personally feel qualified to attend, is the Symposium on Fatigue, to be held in Sweden. Our boss is in a position to send the tiredest old editor for miles around, and if this Swedish conclave is as hard on a man as the Mining Congress meeting in San Francisco, we'll show them some fatigue that will make their heads swim.

**Shortly after The Great Preposition Disaster** of '54, as we refer to it in our diary, we had a letter from Sheila Deane who is friendly, pretty and a geologist for the Texas Gulf Sulphur Co. Miss Deane flung us (flang us?) another grammatical challenge and in bending over to pick up the gauntlet, we fell flat on our face, an accident that could happen to anybody. Miss Deane defied us "to make an intelligent sentence containing the word 'and' five times in a row." For two months we have strained our mental resources, and my, how easy they strain these days! Our surrender is unconditional and we now pass along the challenge to the fistful of eager grammarians in the audience who, we are convinced, are out to get us anyhow. Any takers?




**Device at left is a Panic Button,** patent unapplied for. PB is Technology's answer to the ulcer and is endorsed by medical men throughout the Sanskrit-speaking world. We recommend it highly for mill men suddenly finding the tails running 2% copper; for mine superintendents who find themselves driving off the first tee without their favorite five iron in the bag; and for geologists faced with having to make a completely unqualified statement. Next month: the ulcer's answer to Technology.

**Arranging a musical program** for the members whose interest lies primarily in the mining industry, occupied most of the last meeting of the E&MJ Chowder, Marching and Margaret Sullavan Society. The meeting was held in the South Brooklyn Dog Laundry and all officers were present, more or less. That is, all the officers checked in but shortly after roll call, an elderly patron loaded the Treasurer into No. 7 Bendix along with a brace of Pomeranians. The Treasurer was unable to return to the floor until midway through the second rinse, a matter of 42 minutes.

The meeting however, proceeded apace. The following musical numbers were selected as appropriate for the Society's forthcoming Eighth Underground Saturnalia.

"Baby It's Gold Outside"
"Lead Sales in the Sunset"
"I Concentrate on U" (Moab Men's Chorus)
"Because You're Mine"
"I Was Seeing Moly Chrome"
"Slurry with the Fringe on Top"
"Drifting and Dreaming" (Jackhammer solo)
"I've Got You Under My Tin"
"Shale, Shale, the Gangue's All Here"

Before adjourning, the Treasurer reported from inside a Westinghouse dryer that the Society had entered deficit financing when one of the Pomeranians mugged him in the Bendix and promptly squandered the entire treasury on chlorophyll dog biscuits.

ENGINEERING AND MINING JOURNAL

NOVEMBER 1954

# What About the Shortage of Mining Engineers?

A CURIOUS SITUATION to which we would draw your attention is the recruiting activity of the mining industry among engineering graduates. So little of it is done. The curious part about this, is that a good many people in the industry appear to be worried about a shortage of mining engineers and the decreasing enrollment in mining schools.

Enough concern was expressed so that the New York Section of AIME devoted an entire meeting to the problem and a lively session it was. Consensus at this meeting, and in line with comment elsewhere, was that the industry, its publications and its societies should launch a broad campaign to make the public, especially boys in high school, aware of the glamour of mining. This would encourage a lot of young men to take up mining.

As a potential agency for waging the glamour campaign, we are somewhat disturbed. We agree that there is a shortage of mining engineers; that the choking off of a supply of good young graduates now will seriously hurt the industry in the near future, when capable technical leadership will be sorely needed to meet increasingly difficult technical problems that come with deeper mines and leaner ores. But is this glamour treatment the answer?

It seems to us that more immediate, more effective steps can be taken. Take for instance, this business of contacting senior engineering students. Petroleum, chemical, electronic and aviation industries for the most part, make this a regular practice. Quite soundly they believe that they can acquire better talent if they shop around. They have been walking off with the cream of the crop and incidentally doing a fine job of selling their industries to the young men.

On the other hand, here's what Dean Signer of Colorado School of Mines said in a 1949 article in *E&MJ*: "I must admit that our mining students are somewhat concerned in regard to the prospect of employment. . . . This concern stems from the fact that the mining companies (with the exception of . . . one of the large companies last year) do not send representatives to our campus for . . . recruiting engineers."

This cold shoulder is indeed curious for an industry which is "concerned" about the decreasing number of engineers entering its ranks, yet representatives of leading mining schools the nation over confirm Dean Signer's statement.

Then there is the matter of salary. In the last few years, salaries in the industry have climbed, but according to several private studies made by companies checking their own salary structures, professional pay in the mining industry still lags slightly behind that of other industries competing in the same talent market.

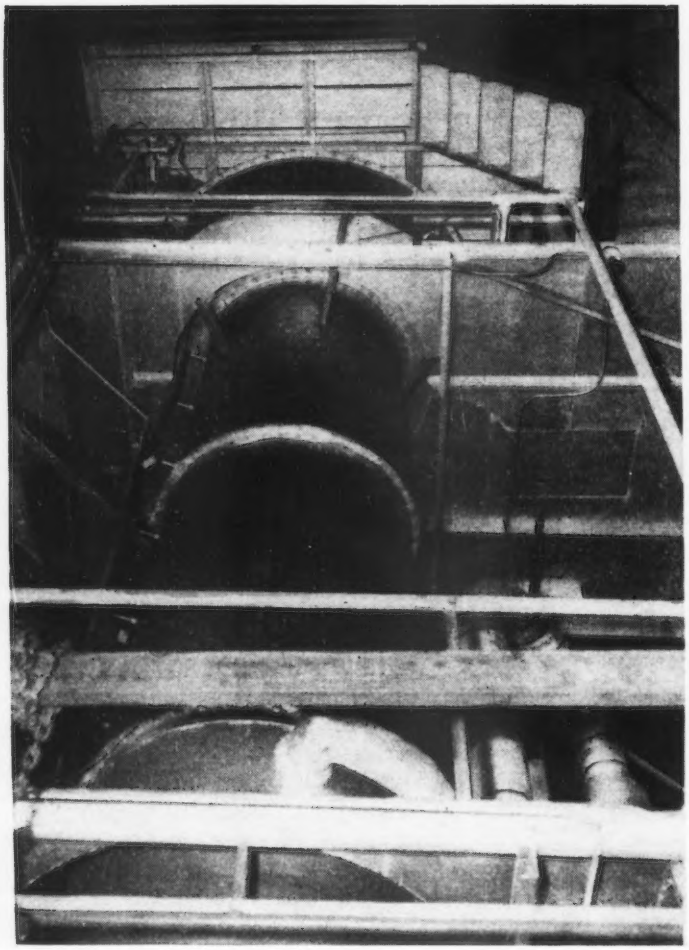
Rightly or wrongly, too many men in the upper echelons of mining are prejudiced against high salaries for youngsters. "I started at $50 a month and glad to get it," is certainly a human reaction but we are faced with a competitive problem in which this attitude is a serious handicap. Nor do economics justify lower salaries. If for a few dollars more, better men are attracted to mining, they will more than make up the price difference in a few years.

We who are in mining primarily because we find it exciting and absorbing are inclined to take a dim view of young men who have to be lured into the industry. But we are a peculiar breed. In a survey (*E&MJ*, January 1947) 66% of those queried found starting salaries unattractive, 58% reported unsuitable job training, 70% felt promotion too slow, 89% said salary increases were insufficient and 56% found living accommodations inadequate, yet a surprising 62% would take up mining again if they had it to do all over.

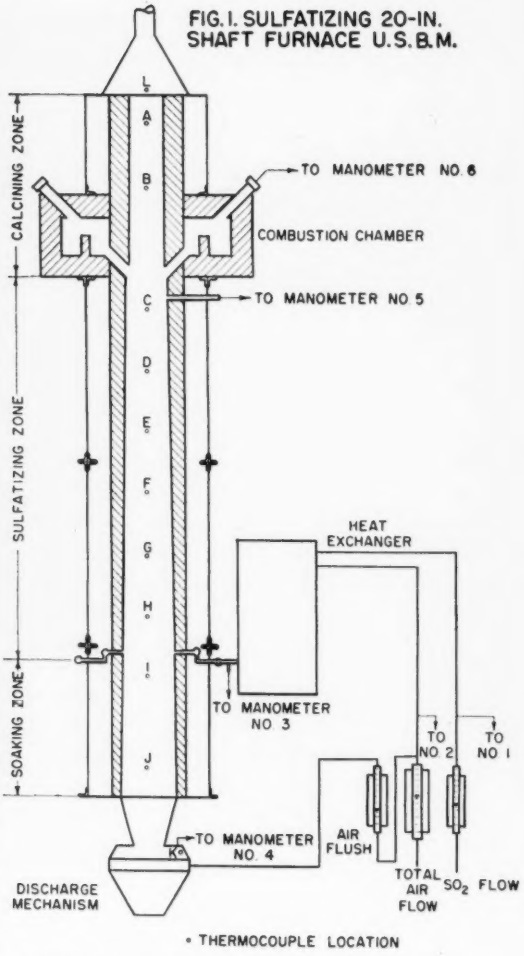
Beyond recruiting and salaries, mining might be more attractive to the young men it wants and needs if companies had well-organized programs that would prevent the indefinite chaining of capable, imaginative young engineers to routine jobs and provide for advancement of good men to better jobs.

These steps would not only make mining more attractive as a career for engineering students, they would reduce the startling number of graduate mining engineers who leave the industry every year.

With this kind of an industry there would be no hesitation about pulling all stops in selling mining as a career.



**SULFATIZING FURNACE** (looking up) is used in first pilot plant step in recovery of manganese from low-grade Cuyuna iron-carbonate deposits.




**THREE ZONES** in the sulfatizing furnace do three different jobs.

# How USBM Metallurgists Are

**THE PROBLEM: Virtually all industrial steel requires manganese as an alloy or a purifying agent but no high-grade deposits have been found in the United States.**

**Now the USBM has come up with an answer.**

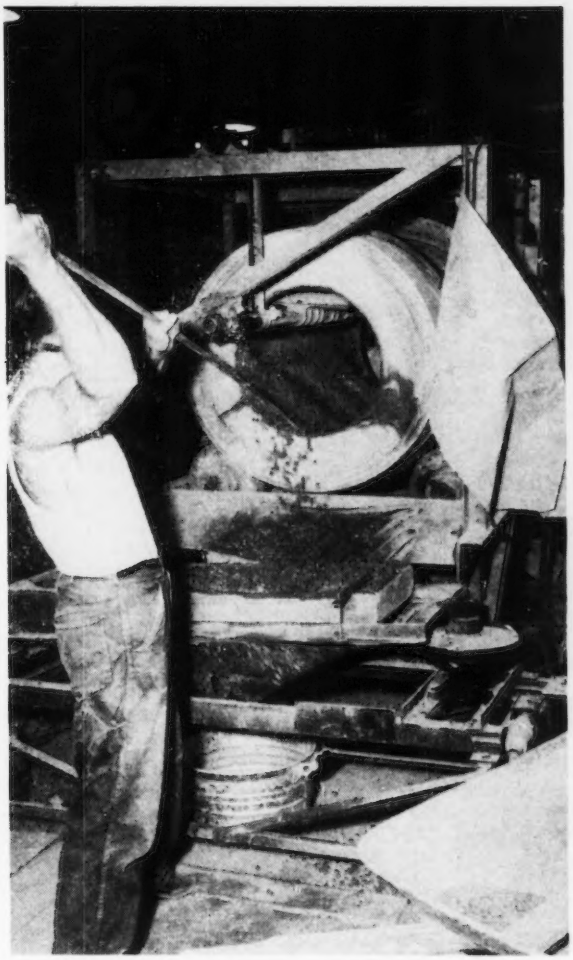
CHARLES PRASKY
Metallurgical Chemist
Region V, Bureau of Mines
Minneapolis, Minn.

TO OVERCOME the critical shortage of manganese in the United States, the U. S. Bureau of Mines, after three years of investigation, has developed a process to beneficiate the nation's large deposits of low-grade manganese-bearing materials.

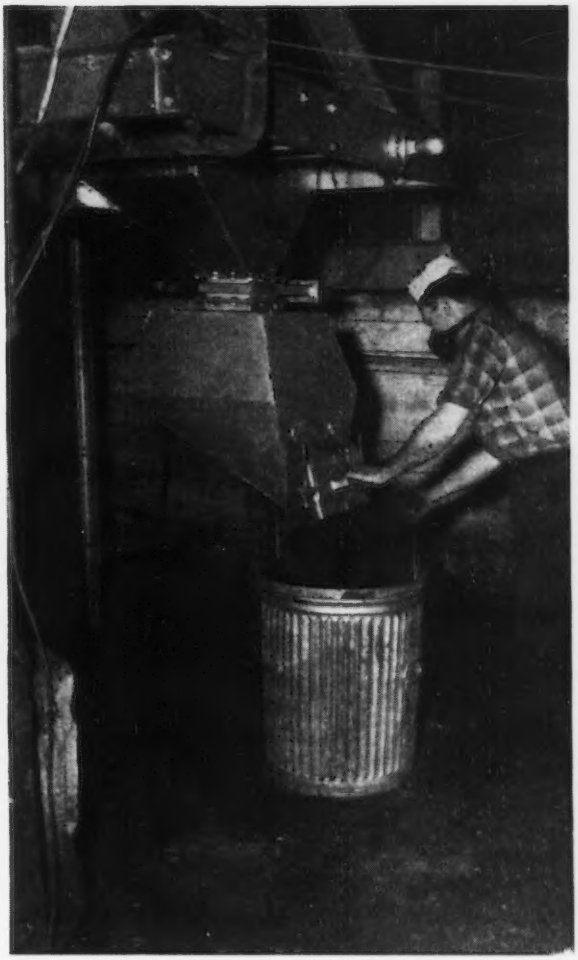
Differential high temperature sulfatization is the process and the manganese-iron carbonate deposit of the Cuyuna range (Minnesota) was the guinea pig for the Bureau's Metallurgical Division at Minneapolis where the experimental work was carried on. The assumption is that any hydrometallurgical method successful in beneficiation of the difficult carbonate slate also can be successfully used for Cuyuna oxidized ores.

## Proposed Methods

Several chemical methods have been proposed for recovering the manganese. An important economic consideration in selecting one of these methods is availability of the chemical reagent. Fortunately large tonnages of sulphur are available on the Cuyuna range. This sulphur is found in low-grade pyrite and pyrrhotite deposits that are readily concentrated by flotation to a suitable feed for a sulphide roasting furnace. It also has been established that, as a result of decomposition, these pyrite and pyrrhotite concentrates are a potential source of marketable iron oxide.



**PELLETIZING** is done in this drum to prepare carbonate slate as feed for the sulfatizing furnace.



**SULFATIZED PRODUCT** from furnace is a water soluble salt. Process was three years in development.

# Solving the Manganese Shortage

Therefore, if these sulphide deposits were utilized in a recovery process for manganese, beneficiation of two heretofore worthless mineral deposits would be accomplished.

## Other Methods

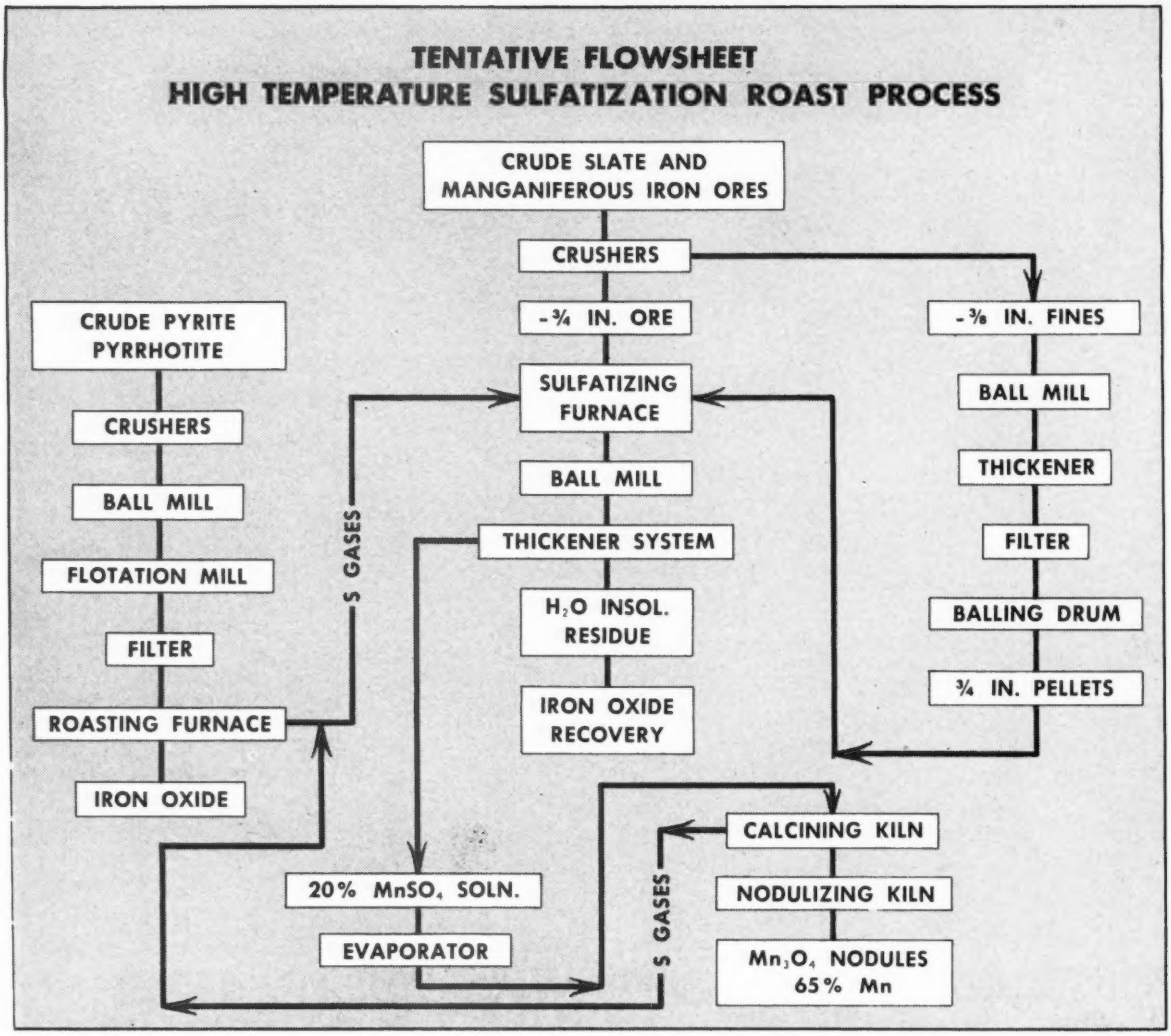
As a preliminary step in investigating hydrometallurgical methods for this beneficiation, an abstract of proposed leaching processes was prepared at the Minneapolis station. Small-scale applications of the sulphur dioxide-air leach, the ammonium sulphate leach, and the sulphuric acid roast were then tried. The material treated was taken from a 70-ton stockpile of Cuyuna green carbonate slate assaying about 7% manganese and about 27% iron.

In view of the results obtained from the small-scale tests, the sulphur dioxide-air leach did not appear suitable for treating Cuyuna carbonate slates. Attempts to devise a method of roasting to convert most of the manganese carbonate to readily soluble manganese dioxide were unsuccessful. The best manganese extraction, without extraction of prohibitive amounts of iron, was about 45%.

Manganese-extraction values with the ammonium sulphate leach were somewhat higher. A maximum recovery of 76% manganese was obtained when the carbonate slate was first given an oxidizing roast and then subjected to a reducing roast in dry hydrogen. However, an excessive amount of iron was also extracted. The ratio of manganese to iron was 2:25, which is insufficient for a ferrograde product.

Excellent manganese extractions were obtained in laboratory testing of the sulphuric acid roast process. Manganese recoveries of over 90% were obtained with amounts of acid three times the equivalent of manganese in the carbonate slate. A high-temperature roast was required, however, to calcine the iron sulphate that was readily formed in the acid digestion of the carbonate slate.

It was at this time that the preliminary work on the present differential high-temperature sulfatization process was tried. Manganese recoveries of 90% and better were obtained in laboratory tests. This sulfatization procedure appeared to be the most practical method of leaching the carbonate slate material. Therefore a more intensive study of this process was undertaken. *(Please turn page.)*




## Outline of Process

Essentially this process consists of: (1) a relatively low temperature roast or calcination of the carbonate slate and (2) treatment of the hot charge with a mixture of sulphur dioxide gas and air to convert the manganese to a soluble sulphate. The need for concentrated sulphuric acid is avoided. Removal of carbon dioxide from the slate during calcination produces a more porous structure and permits easier permeation of the sulfatizing gas mixture. The temperature range for this conversion of manganese has been established as 600 to 850 deg C. Iron sulfate is not formed at these high temperatures, and phosphorus is not converted to a water-soluble form. A water leach of the sulfatized product selectively dissolves the manganese sulphate. Iron and phosphorus remain in the leach residue as water-insoluble calcination products of the sulfatized ore.

Commercial-refrigerant sulphate dioxide was used in the sulfatizing gas mixture to expedite the laboratory investigations. This sulphur dioxide gas, diluted with 9 parts of air, approximates the composition of a gas that could be produced in roasting pyrite and pyrrhotite concentrates.

A choice of either a FluoSolids reactor or a shaft furnace was indicated for the solid-gas reaction of ore and sulfatizing gas. The shaft-type furnace was selected for the preliminary small-scale tests and the subsequent larger scale tests because the personnel was more experienced in shaft-furnace operation. Differential sulfatization in a FluoSolids reactor should also be investigated.

## Small-Scale Tests

In the investigation of leaching methods, about 170 small-scale batch tests were made. It was found from these preliminary tests that the manganese recoveries in the sulfatization process varied, depending on the particle size of the product sulfatized. Under similar conditions of temperature, reaction time, and gas composition, ½-in. pellets agglomerated from minus-65-mesh carbonate slate fines were sulfatized more completely than crude carbonate slate of the same size. The strength of the pellets both before and after calcination was excellent, indicating that they would be suitable feed for a shaft furnace.

In conjunction with these small-scale tests, preparations were made to adapt an 8-in. by 6-ft. externally heated alloy shaft furnace for the sulfatization process. Ten batch tests and two continuous runs were made with this furnace.

During a 5-day continuous run in the furnace with a feed rate of 15 lb of carbonate slate pellets an hour, the average conversion of manganese to soluble sulphate was 72%. During a 12-hour period, however, 85 to over

90% of the manganese was converted to the soluble sulfate.

Much of the heat requirement for this test was supplied by exothermic reaction of the sulfatizing gas with the carbonate slate. The outside wall of the alloy shaft furnace was heated by one gas burner. As the test progressed, the flame from this burner was gradually decreased until it was necessary to operate the burner on an off-and-on basis. Sulfatization of the slate proceeded at optimum temperatures for periods as long as 3 hr with the burner completely off.

Products from the furnace were leached with water. Qualitative tests showed no phosphorus in the leach solutions, and manganese-iron ratios averaged about 25:1.

About 48% of the sulphur dioxide entering the system was recovered as soluble manganese sulfate. This utilization of sulphur dioxide was considered satisfactory in view of the short column of material treated. The need for a larger shaft furnace designed to carry out the sulfatization reaction on a more efficient basis was indicated.

## Furnace Designs

In October 1951, preparations were made for the design and construction of a 20-in. dia cylindrical shaft furnace in the Mines Experiment building, University of Minnesota, Minneapolis.

The refractory-lined 23-ft column of this vertical furnace contains 3 zones, as shown in Figure 1. In descending order, there is a 6-ft calcination zone at the top, a 12-ft sulfatization or reaction zone, and then a 5-ft soaking or cooling zone. Encircling the furnace at the bottom of the calcination zone is a combustion box with two gas burners fired tangentially to each other. The combustion gases are introduced through four ports in the refractory lining of the furnace. Sulfatizing gas enters the furnace through a stainless steel manifold at the lower end of the 12-ft reaction zone and passes upward through the furnace countercurrent to the descending carbonate slate. Sulfatized ore is discharged from the bottom of the furnace by means of a modified traveling-grate mechanism.

## Furnace Operation

Although handicapped by delays in delivery of equipment and materials and also by a manpower shortage, the furnace was completed and enough material was prepared for a 1-week continuous shakedown operation by July 1952.

Five additional tests have been completed to date in the 20-in. dia cylindrical shaft furnace. These tests have varied in duration from two weeks to one month. In addition to gaining experience in operating technique, each test has indicated modifications.

A primary interest in these tests has been the economy of sulphur utilization. Although optimum operating conditions have not as yet been fully established, only traces of sulphur gases are detected at times in the furnace exhaust system.

Major difficulties encountered in operating the furnace have been a materials-handling problem because of lack of storage space, defects in the original design of the furnace discharge mechanism, and adequate control of temperature.

The material sulfatized in the first four tests was carbonate slate (Sagamore mine) pellets prepared from minus-65-mesh fines. The furnace discharge mechanism, as originally designed, could not be operated with a burden of coarse ore pieces. The fine particle size of the ground ore in the pellets contributed greatly to a rapid exothermic reaction of ore with sulfatizing gas. Because it was necessary to maintain the heat of this exothermic reaction below 850 deg C, the rate of feed through the reaction zone of the shaft was limited. Only 30 lb of pellets an hour for each sq ft of hearth area could be treated to obtain products containing 80% sulfatized manganese.

## Increased Production

Therefore, one objective of recently completed test 5 was to increase the hourly production of manganese sulphate. The furnace-discharge mechanism was modified to permit a burden of coarse ore and the material to be treated was taken from a 20-ton stockpile of minus-⅜-in. plus-6-mesh carbonate slate. An hourly feed rate equivalent to about 90 lb of minus-⅜-inch plus-6-mesh carbonate slate was attained for each sq ft of hearth area. The limited speed of the discharge mechanism did not permit a faster feed rate.

A temperature gradient of not more than 60 deg C was indicated in the 12-ft vertical reaction zone by thermocouples spaced at 2-ft intervals.

Analysis of the material from test 5 indicated that the product contained 74 to 80% of the manganese as soluble sulphate. The manganese-iron ratio in the leach solutions of the sampled furnace products varied from 19 to 55. This ratio was a distinct improvement over the best manganese-iron ratio of about 7, obtained in previous tests in the 20-in diameter shaft furnace.

## Future Developments

A sufficient quantity of an acceptable sulfatized product has now been stockpiled for leaching studies. In line with the unitized approach adopted in the pilot-plant development of the sulfatizing process, operation of the sulfatizing furnace will be recessed temporarily. A more active investigation of the leaching of sulfatized products and the subsequent extraction of a ferrograde manganese from leach solution will be undertaken. The study of the sulfatizing step will be continued however because optimum operating conditions and necessary engineering design data for a commercial plant have not been fully developed.

## Tentative Flowsheet

The following description of a tentative flowsheet (p 74) shows briefly how the sulfatization process would be adapted to the treatment of carbonate slate and marginal manganese oxide ores.

Crude ore and slate are crushed to pass a ¾-in. screen. The minus-⅜-in. fines are separated by screening and ground to minus-65-mesh. The ground product is agglomerated to form pellets approximately ¾ in. in diameter.

The minus ¾-in. ore and pellets are then charged into the top of the shaft furnace, where they are heated to a temperature of not more than 480 deg C by the products of combustion of gas, oil, or powdered fuel.

As the hot charge descends through the furnace it is treated with sulfatizing gas in an amount not to exceed 1½ times the manganese equivalent in the charge.

After approximately 8 hr resident time in the sulfatizing zone the product is discharged and ground to the appropriate size for extraction of soluble manganese by means of a series of thickeners in a countercurrent decantation system.

Manganese in solution is recovered by evaporation of water and calcinaphur economy is maintained by recycling the sulfatizing gases produced tion of the manganese sulphate. Sulin the manganese sulphate decomposition.

The calcined manganese oxide fines are then nodulized in a kiln to furnish a suitable ferrograde product containing over 60% manganese.

Iron oxide resulting from the decomposition of pyrite and pyrrhotite concentrates for the production of sulfatizing gas and iron oxide, recovered from leach residue following extraction of soluble manganese, are beneficiated to furnish a marketable product.

**A NICE SMILE, NOW,** urges Margaret Ralston (back to camera) as she poses four ladies attending San Francisco meeting of American Mining Congress against Golden Gate backdrop. They are: Mesdames John Lokken, Berkeley; S. R. Zimmerley, Salt Lake; Kuno Doerr, Jr., East Helena; Roy O'Brien, Salt Lake. To meet Miss Ralston turn to p 112.

# What The Ladies Did In San Francisco

MARGARET RALSTON
Chief, Pacific Coast News Bureau
McGraw-Hill Publishing Co.
San Francisco, Calif.

Photographs by
ROBERT LACKENBACH
San Francisco
Calif.

No one enjoyed the San Francisco meeting of the American Mining Congress in September more than the ladies who attended it. Except possibly those San Franciscans who had the time of their lives planning and directing the ladies' events.

We San Franciscans love to show off our beautiful town, especially to visitors as enthusiastic as the 1300 ladies who registered for the AMC meeting. Headed by Mrs. Philip Bradley, Jr., the ladies committee designed a program to let the city be extravagantly admired. As, indeed, it was.

Monday's reception and tea introduced the ladies both to each other and to the fantastically lovely setting of the Palace of the Legion of Honor, high on a quiet hill overlooking the sparkling Pacific and the Golden Gate. Did they enjoy it? Who wouldn't?

**LAST MINUTE DETAILS** of reception for AMC ladies are discussed by Mrs. Lawrence B. Wright, committee member, and Mrs. Philip R. Bradley, Jr., general chairman for all ladies' events.

Next day, they saw the Golden Gate from another setting, the old-fashioned elegance of the Claremont Hotel in the Berkeley Hills. Wednesday and Thursday they went shopping, either on their own or on special guided tours that took them behind the scenes at many famous shops.

All in all, from the immensely popular ladies' coffee hospitality room in the Fairmont Hotel, where each day usually began, to the lush fashion show on Thursday in The Mark Hopkins Hotel, it was a wonderfully exciting week.

The weather was perfect; San Francisco's restaurants were at their unmatched best; the flowers were never more beautiful, whether you saw them in the sidewalk stands or in the lavish displays of Podesta and Baldocchi. Judging by the snatches of conversation I heard as I went about with the AMC ladies, husbands in mining camps everywhere are going to hear a lot about San Francisco this winter. Well, why not come back some time? It's a wonderful place. We love it, and so will you.

**PERFECT WEATHER** made memorable the Mining Congress ladies' visit to the Palace of the Legion of Honor for reception on Sept. 20. The Palace is a museum, housing a permanent collection of French art. Guests at the reception, numbering about 520, met in garden room, then wandered through galleries. Note Golden Gate Bridge showing through archway.

**TAKING NO CHANCES,** Adele Stockman, Hazel McClung, and Jane Kett, all Californians, study city map to check return route. Their bus, piloted by a Los Angeleno, got lost on way out.

**STROLLING** are: Mesdames D. J. C. Copps, Wilmington; Granville S. Borden, Piedmont; J. M. Bowlby, Cincinnati; J. L. Romig, Wilmington; Gloyd Wiles; H. W. Wildner, New York.

**DELIGHTED** are Mrs. Harold E. Lee and Mrs. George Dunn, both of Kellogg.

**INTRIGUED** are Mrs. B. C. Essig, Denver, who was ladies' chairman for the 1952 AMC meeting, and Mrs. Harlowe Hardinge, York, Pa.

**AMUSED** are Mrs. Worthen Bradley, San Francisco, transportation co-chairman for the meeting, and Mrs. Felix Wormser, Washington, D. C.

# They went to a reception . . .

**GREETING** guests are Mrs. Ralph Gottshall and Mrs. Frank Milliken. Greetee is Mrs. Donald Delicate, Moab, Utah.

**STUDYING** a Rodin bust are Mrs. Tom Martin, wife of Iowa Congressman, and Mrs. L. J. Randall, of Wallace, Idaho.

**WAITING** for guests are Mesdames Malcolm Gould, Ralph Utt, and Lawrence Wright, all hostesses.

**ON WAY** to reception are Mesdames Julian D. Conover, Washington; Donald H. McLaughlin, Berkeley; and Howard I. Young, St. Louis, all wives of top AMC executives.

**DICTIONARY** helps Mrs. E. H. Lovitt, Wenatchee, Wash. (right), chat in Italian with Mrs. Piero Zuffardi (center) and Mrs. Fillipo Minghetti, both of Montevecchio, Italy.

**ROUNDTABLE** includes (top row) Mesdames Jack Stilton, Carlsbad; Parker S. Dunn, Trona; Neltje LeBaron, Lakeland, Fla.; W. H. Bruhn, Carlsbad; (front row) Nelson White, Chicago; R. R. Knill, Carlsbad; Felix Wormser, Washington; E. W. Douglass, Carlsbad; (back to camera) Mrs. B. C. Essig, Denver.

**POURING** is Mrs. F. H. Hammersmith, San Francisco. Sipping tea are Mrs. George Trescher, Berkeley, and Mrs. Grace Whisenant, of Salt Lake City.

# They went to a tea . . .

**CANADA** was represented in group including Mesdames R. R. McNaughton, Trail, B. C.; R. B. Shelledy, Garrison, Mont.; W. G. Jowitt, Trail; and J. R. Giegerich, Kimberley, B. C. Tea was held in garden room of Legion of Honor.

**PAUSING** at tea table are Mrs. H. A. Sawin, Oakland, and Mrs. William W. Mein, Jr., chairman for reception.

**TEA OUTDOORS** for (clockwise) Mesdames J. E. Chiles, Denver; F. C. Traver, Waukesha; R. K. Burgess, Portland; M. W. Head, Phoenix; and A. L. Mather, Portland.

**IDAHOANS** included Mrs. Robert M. Hardy (right); her daughter-in-law, Mrs. Robert M. Hardy, Jr. (center), and Mrs. N. J. Osborne, all of Kellogg. Tour of city followed reception.

**ONLY ONE LADY** (center) wasn't spellbound by this black cocktail dress (or short evening frock) with mink stole, modeled at Saks' fashion show, which included a few Dior-look creations. Our photographer actually receives pay for doing this! Show was held in Peacock Court of Mark Hopkins. Saks' noted small run on store soon after show. Husbands noted it, too.

# They went to a fashion show, and then shopped . . .

**CRYSTAL-GAZING** at Gump's famous store are Mesdames John Rogers, Walnut Creek; Gloyd Wiles, New York; Kenneth Kellar, Lead, S. D.; and J. M. Bowlby, Cincinnati. Ladies also were admitted to store's private showing of priceless jade.

**FIRE-BLUE CLOCHE** in Saks' Fifth Avenue looks good to Mrs. Wiles and Mrs. Wormser. We liked it, too.

**ENTRANCED** by fashion show are (in front), Hazel McClung, Redding; Jane Kett, Berkeley; (in back) Mrs. James Bradley, San Francisco; Mrs. Earl Singleton and Mrs. R. Ellerton Binns, of London, England.

# How Sulphide Volatilization Can Be Used in Metallurgy

A. W. SCHLECHTEN
Professor of Metallurgy
Missouri School of Mines
and Metallurgy

VOLATILIZATION OF METAL SULPHIDES can be used to advantage in a variety of metallurgical processes. Valuable metals can be recovered or undesirable elements can be eliminated if they will form volatile sulphides. Likewise, metal sulphides can be separated if there is a sufficient difference in their volatilities.

The successful application of these principles has not always been possible in the past because of the difficulty in maintaining a proper atmosphere in the furnace. A substantial flow of gases is needed to transport the sulphide vapor, but if this is obtained by admitting too much air, the sulphides will be oxidized and the volatilities will be lowered.

Recent commercial installation and laboratory investigations have shown that fluid-bed roasters are particularly applicable to sulphide volatilization because the composition of the up-rising gas can be closely controlled.

## Sulphide Behavior on Heating

If metal sulphides are heated in the absence of air there is a tendency both for volatilization and decomposition; one or the other may predominate and be the major source of weight loss.

A good example of sulphide decomposition is the behavior of $Ag_2S$ which upon heating in vacuum readily gives off sulphur vapors and leaves behind a residue of pure silver. If heated in air, the $Ag_2S$ decomposes even more readily because of the exothermic formation of $SO_2$.

In contrast with this we find that if CdS, ZnS and others are heated in absence of air, the original material loses weight and it appears that the sulphide has volatilized as such. Whether or not the actual sulphide molecule exists in the gaseous phase may be open to debate, but it suffices to say that such sulphides volatilize so that both metal and sulphur are lost in close stoichiometric proportions and a sulphide is recovered in the condenser.

Other sulphides upon heating lose sulphur faster than they do metal so that the composition of the remaining material is changed. Kohlmeyer has boiled PbS, $Sb_2S_3$, and SnS at atmospheric pressures; the simultaneous dissociation of the sulphides caused an enrichment of metal in the sulphide melt and a raising of the boiling point. A special example of this behavior would be the well known phenomenon of pyritic sublimation where in $FeS_2$ breaks down to the relatively stable FeS, $CoS_2$ to CoS, and NiS to $Ni_3S_2$.

Finally there are sulphides that in the absence of air or moisture show practically no tendency towards volatilization or decomposition. These refractory sulphides, especially ThS, can be made into crucibles and other shapes for use at high temperatures and under high vacuum. They are stable and resist the corrosive action of metals and halides.

Thus, with such widely differing properties displayed by the sulphides it is possible to make a variety of separations.

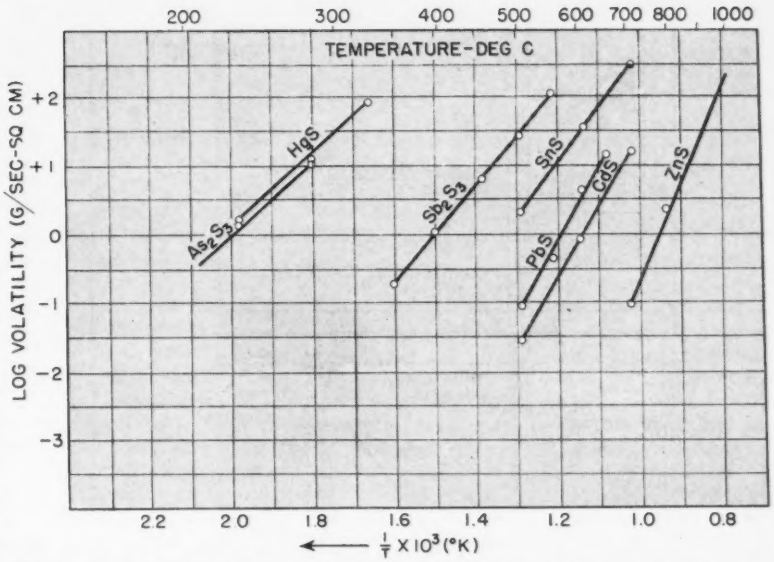



**Fig. 1.** Rate of weight loss by volatilization of various sulphides when heated under vacuum. (After C. M. Hsiao.)

## Elimination of CdS and PbS from ZnS

Fig. 1 shows the great difference in the rate of volatilization of CdS, PbS, and ZnS when heated under a high vacuum according to the work of C. M. Hsiao. At a given temperature the volatility of CdS and PbS is greater than ZnS by at least two logarithmic units on the vertical scale, which is equivalent to a factor of 100.

This difference can be used in a practical way to eliminate small amounts of Cd and Pb from zinc concentrates. One retort plant takes partially roasted concentrate and feeds it to a rotary kiln. Sufficient sulphur has been left to combine with all of the Cd and Pb. Under the conditions of the kiln, much of the PbS and CdS is volatilized and eliminated from the retort feed.

Najarian, Peterson and Lund have explained how the volatility of CdS and PbS can be utilized to eliminate them in sintering for zinc smelting. At Josephtown the sinter for the high-grade circuit is made in two passes. The first operation makes a soft open sinter in which the volatile PbS and CdS can migrate to the bottom of the bed. The top of the bed is relatively free from these two impurities and is removed by a special slicing device, re-sintered with addition of silica to make a hard sinter, and smelted to give a high grade zinc.

## Effect of Furnace Atmosphere

Tests made in the author's laboratory by John Boxall show that a non-

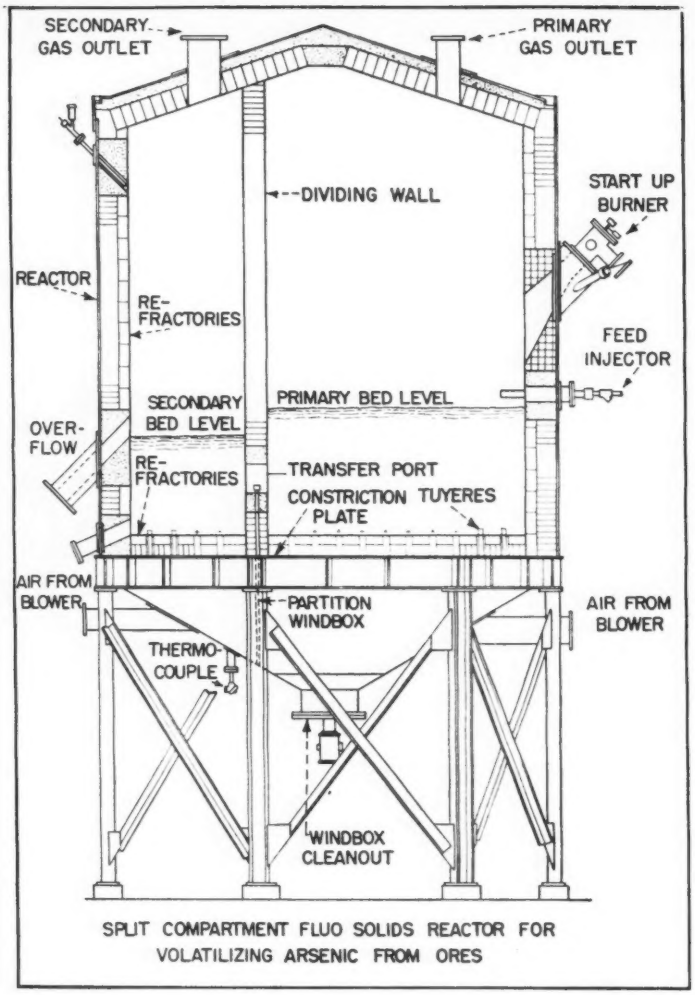



**Fig. 2.** Roaster used to treat arsenical gold concentrates. Right compartment operates with a deficiency of air.

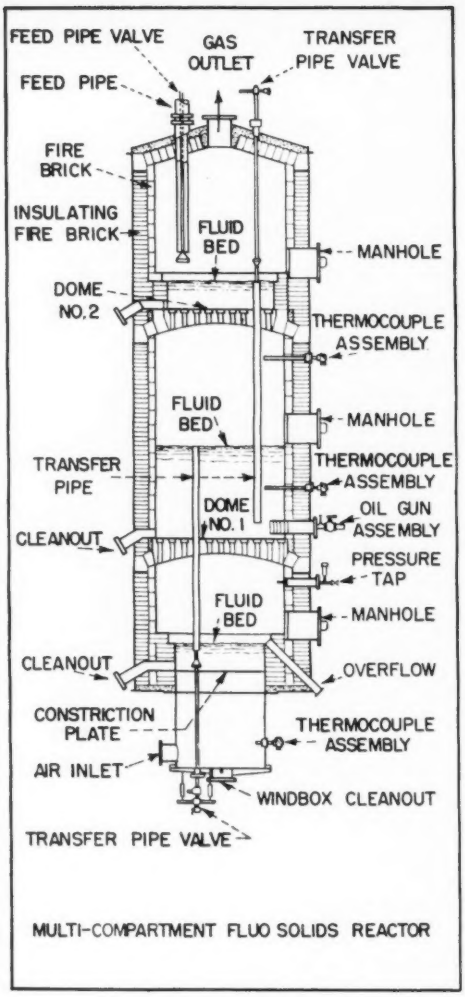



**Fig. 3.** Roaster for volatilizing tin sulphide from low-grade ores.

oxidizing atmosphere is much more effective in eliminating PbS and CdS from zinc concentrates than the oxidizing conditions of a regular roaster. This, of course, is to be expected because CdS and PbS have a higher vapor pressure respectively than CdO or PbO.

A synthetic mixture of ZnS, CdS, and PbS was made containing 7.2% Pb and 0.70% Cd. Samples of this mixture were heated in a boat in an electric tube furnace with measured amounts of nitrogen, carbon dioxide, or air passing over the sample. The results are shown in Table I, and it can be seen that either of the non-oxidizing atmospheres is preferable to air.

## Commercial Equipment for Atmosphere Control

The requirement of a non-oxidizing atmosphere for effective sulphide volatilization is somewhat embarrassing if it is also necessary to have strong oxidizing conditions for the usual roasting reactions. It is evident that a two-step process of some kind is required. The previously mentioned method of partial roasting of the concentrate followed by treatment in a rotary kiln with a neutral or reducing atmosphere is one approach. Another attractive possibility is the use of a split compartment fluid bed reactor as shown in Fig. 2.

The apparatus of Fig. 2 has been utilized for treating arsenical gold concentrates. A deficiency of air is supplied to the first compartment so that arsenic will distill off as the highly volatile sulphide which can be recovered if desired. In the second compartment, to which the partially roasted calcine transfers automatically, an excess of air is supplied. This burns off the balance of the sulphur, giving a fully oxidized calcine suitable for cyaniding.

Such split compartment reactors have been installed at Negus Mines and Giant Yellowknife in Canada; at Falcon Mines in Africa, and at St. John del Rey in Brazil by the Dorr Co.

## Recovery of Valuable Sulphides

The three-compartment fluid bed reactor shown in Fig. 3 has been developed for volatilizing tin sulphide particularly from low grade tin ores containing or mixed with sulphide-bearing materials. Details of a two-compartment reactor are given in U. S. Patent 2,600,351 to Wells, Thompson and Roberts.

The upper bed is kept at approximately 900 deg C which is sufficient to volatilize tin sulphide. At the same time the pyrite in the ore evolves sulphur vapor which converts any tin oxide to the stannous sulphide. The patent states that as little as 1% sulphur-vapor in the gases will convert the cassiterite to sulphide.

After removal of the tin, the mate-

rial from the top bed transfers to the lower, or roasting beds, which operate at about 1100 deg C. The main purpose of these is to supply heat for the gases which rise up to the volatilizing bed; additional fuel may be necessary. The gases for the roaster consisting of air and returned gas must be so proportioned that there is no excess of oxygen after they pass through the roasting bed.

The patent states that it is difficult to separate the SnS vapors from the gas stream, so air is injected into the tin-bearing gases while they are still hot to form $SnO_2$ which can be collected in a bag filter. An alternative plan is to scrub the sulphide vapors with caustic or calcium hydrate.

Kenworthy and Absalom of the U. S. Bureau of Mines have shown that germanium, probably in the form of sulphide, can be volatilized from Tri-State concentrates. Their experiments were made using helium, natural gas, or a partial vacuum above the sample. Presumably a sulphur-bearing atmosphere would be equally suitable. Most of the results indicated that the rate of volatilization of germanium sulphide was intermediate between that of CdS and PbS. At 1000 deg C under helium more than 90% of the Ge was removed from the concentrate in three hours. Because of simultaneous sublimation of CdS, PbS, and ZnS, the percentage of Ge in the condensate was less than 1%, but still much higher than in the original concentrate.

**Table 1. Elimination of CdS and PbS from ZnS by Volatilization Under Various Gases**

(Expressed as a percentage of the original amount in the sample)

| Temp. | % PbS eliminated | | | % CdS eliminated | |
|---|---|---|---|---|---|
| | $N_2$ | $CO_2$ | Air | $N_2$ | Air |
| 1000 deg C | 100 | 100 | 23 | 100 | 30 |
| 900 deg C | 70 | 70 | 12.4 | 50 | 7 |
| 800 deg C | 12.8 | 8.9 | 5.3 | 12 | 12 |

## Separation Upon Condensation

It is obvious that the degree of separation between two sulphides that can be achieved by volatilization will depend on the magnitude of the difference in their vapor pressures. For example, although PbS will volatilize to a much greater extent than ZnS at a given temperature, some ZnS will also be in the gas stream depending upon the amount of surface exposed by each mineral.

A further separation will take place upon condensation; the ZnS will condense first and then later in the colder zone the PbS will come down. Laboratory experiments have shown that if the gas stream is not too turbulent, a good separation is achieved with only a small zone of overlapping.

## Summing It Up

Experience and experiments have shown that in a non-oxidizing atmosphere some metal sulphides can be volatilized and thus be separated from each other and from non-volatile materials. The best examples of this group are the sulphides of Hg, As, Si, Sn, Pb, Cd, and Zn.

Other sulphides will lose sulphur upon heating; but at the temperatures normally used in practice a lower sulphide or the metal itself will remain in the non-volatile residue. Examples of this group are the sulphides of Ag, Cu, Ni, Co, and Mn.

The third group consists of sulphides that have little tendency to volatilize or to decompose even at elevated temperatures. Examples in this group are the sulphides of Th, Hf, Zr, Ba, and the rare earths.

The author wishes to thank T. B. Counselman of the Dorr Co. for valuable information and for two of the illustrations. Some of the data given here are the results of experiments made at the Missouri School of Mines by Dr. C. M. Hsiao and John Boxall.

# Hot Compressed Air Speeds Rock Drilling in Sweden

THE USE OF PORTABLE COMPRESSORS supplying hot compressed air directly to rock drills increases the number of feet drilled per shift by 15 to 25%, as compared with the use of cooled air from a remote stationary unit. This finding is the result of tests carried out by the Atlas Diesel Company in the Kiruna iron ore mines, Sweden.

The experiments have shown that hot air entering a rock drilling machine at about 165 deg F increases net footage of the drill by 10%, which is believed to be due to improved lubrication. The volume of the air required for drilling is smaller, and this means that the capacity of the compressor can be reduced accordingly.

With compressors supplying hot air, it is easier to maintain a constant working pressure, while in central networks, the pressure frequently drops because of uneven work loads, frozen or broken conduits and other factors. Leakage is avoided with the portable compressors, whereas in extensive networks of piping it may amount to as much as 15 to 30%.

Other inconveniences of central air supply, such as condensation and the formation of fog in the shaft, are eliminated in hot-air drilling, because the intake air has a relatively constant humidity and the expansion in the machine starts at a high temperature.

The severe climate at Kiruna, likely to cause conduits to freeze, combined with extensive development tunnels, has made it necessary to provide for a largely decentralized system of compressed air supply in planning the mining operations. The major drilling units are to be combined with separate mobile compressors.

It is pointed out that part of the advantage gained at Kiruna may be explained by specific local conditions, particularly the severe climate. However it is maintained that the decentralized supply and hot-air drilling would result in technical gains under other circumstances as well.

The Kiruna operations started to change over from open-pit to underground operations in 1951 because of an increasing ratio of overburden to ore. After completion of this project and installation of a high-capacity surface plant and hoisting equipment, capacity of the mine will be increased to about 15-million metric tons per year. Project completion has been scheduled for 1957. When completed, Kiruna is expected to rate as the largest underground mine in the world.

A 500-tph hoisting installation is well under way. It will consist of a row of 8 to 10 adjacent hoisting shafts. Hoists are of the friction-drive type mounted directly over the respective shafts. These new four-rope units hoist 20-ton bottom-dump skips.

# Factors Which Should Be Considered In Selecting a Mine Hoist Drive

R. B. MOORE
Member A.I.E.E., Industrial Engineering Section
General Electric Co., Schenectady, N.Y.

THE PURPOSE OF THIS ARTICLE is to simplify the problem of choosing between several basic types of electric mine hoist drives, and of making a further choice between variations in basic types.

The three most common basic types of electric drives are:

**(1)** Wound rotor induction motor with master controller, contactors, and grid secondary resistors. This system will be referred to in this paper as "ac drive."

**(2)** Direct-current, separately excited motor, supplied from constant speed motor-generator set, with adjustable voltage control. The MG set motor usually is synchronous, and this system will be referred to in this paper as "dc (sync)."

**(3)** Direct-current, separately excited motor, supplied from varying-speed flywheel MG set, with adjustable voltage control. This arrangement will be referred to in this paper as "dc (FW)."

Factors to be considered in selecting drive systems are: (1) First cost. (2) adequacy of power supply system. (3) operating characteristics. (4) operating costs.

In general, the first choice is between ac and dc drive. If dc is selected, should a synchronous or induction-flywheel set be used? Should dc dynamic braking be specified for dc drives; or is automatic control for dc drives justifiable? Should the drive be single-motor or dual-motor?

These are the most common decisions to be made, and they are discussed with respect to the four factors listed above.

## First Cost

An analysis of relative costs of electric equipment for the three basic systems (with variations) has been made over an appropriate range of hp ratings. Results are plotted on curves in Fig. 1 through Fig. 5. Table 1 gives the basis on which the cost figures were compiled.

Where possible the dc (sync) drive was used as the base for comparison, since it covers the entire range of hp ratings and has a cost between ac drive and dc (FW) drive. Because of limited use of extremely large ac drives on mine hoists, the ac drives have not been considered in the higher hp ratings shown.

## Comparison of Basic Drive Types

Fig. 1 shows why the ac drive is preferred on a first cost basis. Through 1500 hp the ac drive is about 39% to 50% of the dc (sync) drive, on a single motor drive basis. Above 1500 hp the ac drive jumps to about 55% of the dc (sync) drive for the ratings shown, on the basis of dual ac drive, which is more practicable in these sizes.

Fig. 1 also illustrates the desire to avoid use of flywheel MG sets wherever possible. Through 3000 hp the dc (FW) drive ranges from about 134% to 155% of the dc (sync) drive, on a single motor drive basis. Above 3000 hp up to 6000 hp the comparison is more favorable to the dc (FW) drive, varying from 126% to 135% on a dual drive basis.

There is no known method of accurately predicting flywheel and MG set motor requirements for a given dc motor rating without a complete duty cycle calculation. For the purpose of these comparative cost curves, it has been necessary, therefore, to use average values based on experience in Table 1. Due to the predominance of cylindrical drum hoists today, only data on previously installed cylindrical drum hoist drives was used in obtaining average values.

## Single Versus Dual Drive

To compare single drive with dual drive use curves in Fig. 2. Except for the zone of 600 hp to 800 hp, in the case of ac drive, the electric drive costs favor the single drive. At no rating studied does the dual drive show savings in electric equipment for the dc (sync) system. However, the dual drive does appear less expensive for dc (FW) drives

*(Text continued on p 86)*

[1] Condensed from an informal discussion paper presented at the American Institute of Electrical Engineers meeting, New York, N.Y., Jan. 20, 1954.

## Table 1—Basis for relative cost curves of Fig. 1-5 inclusive

**ALL DRIVES**
- Equipment for 3 phase, 60 cycle power supply
- Equipment suitable for altitudes up to 3300 ft

**AC DRIVES**
- All motors rated 514 rpm, 250% max torque
- Motor voltage:
  - 2300 v up to 1400 hp
  - 4000 v above 1400 hp
- Secondary resistors, NEMA Class 162, for shaft hoists.
- Incoming line panel:
  - Up to 700 hp—50,000 kva interrupting capacity
  - Above 700 hp—150,000 kva interrupting capacity, 2400 v
    250,000 kva interrupting capacity, 4160 v
- Dynamic braking equipment for 175% peak torque.

**ALL DC DRIVES**
- DC motors rated 500 rpm
- DC motors and generators:
  - Rated 200% load, 1 min, occasionally repeated
- Switchgear for MG set motors:
  - 2400 v—150,000 kva interrupting capacity
  - 4160 v—250,000 kva interrupting capacity
  - Assumed to be in line-up with other switchgear; therefore, bus entrance compartment, potential transformers, control power transformer, battery, or charge are *not* included here.

**DC (SYNC) DRIVES**
- MG set motor voltages:
  - 2300 v up to 2000 hp (dc)
  - 4000 v above 2000 hp (dc)
- Switchgear for MG set motors:
  - Full voltage starting up to 3000 hp (dc)
  - Line reactor starting above 3000 hp (dc)
  - Differential protection above 1250 hp (dc)
  - Kvar control included above 1250 hp (dc)

**DC (FW) DRIVES**
- Flywheel hp-sec equals dc hp × 65, up to maximum of 200,000 hp-sec
- MG set motor hp equals dc hp × 0.9, or next higher standard rating
- MG sets maximum slip not over 20%
- MG set motor voltages:
  - 2300 v up to 2250 hp (dc)
  - 4000 v above 2250 hp (dc)
- Switchgear for MG set motors:
  - Full voltage primary starting
  - Differential protecton, 1500 hp (dc) and above.

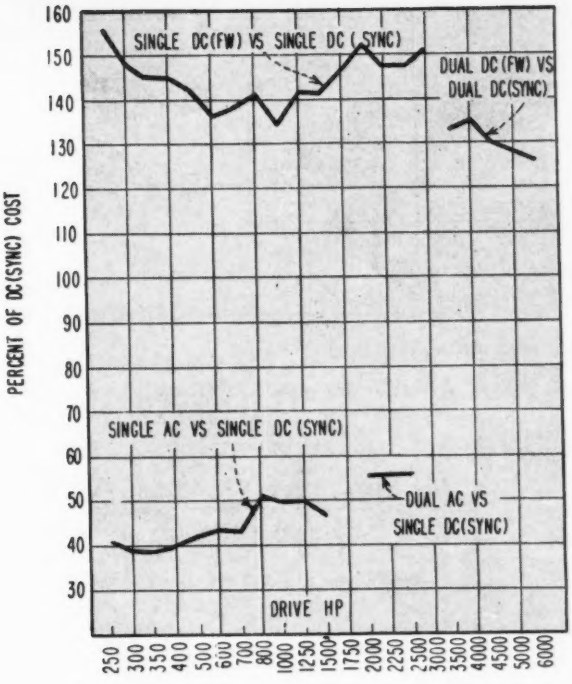

SINGLE DC(FW) VS SINGLE DC (SYNC)
DUAL DC (FW) VS DUAL DC(SYNC)
SINGLE AC VS SINGLE DC (SYNC)
DUAL AC VS SINGLE DC(SYNC)
DRIVE HP
PERCENT OF DC(SYNC) COST

**Fig. 1.** Cost comparisons of basic drive hoists.

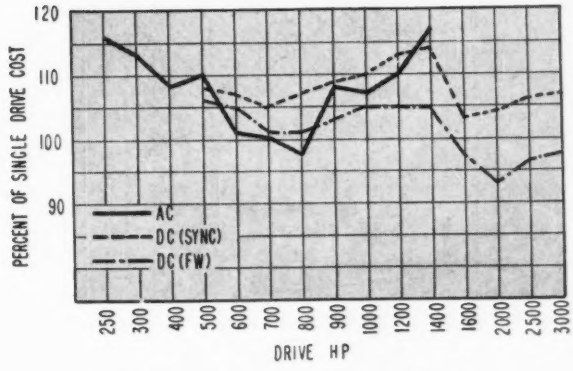



**Fig. 2.** Dual drive vs single drive hoists.

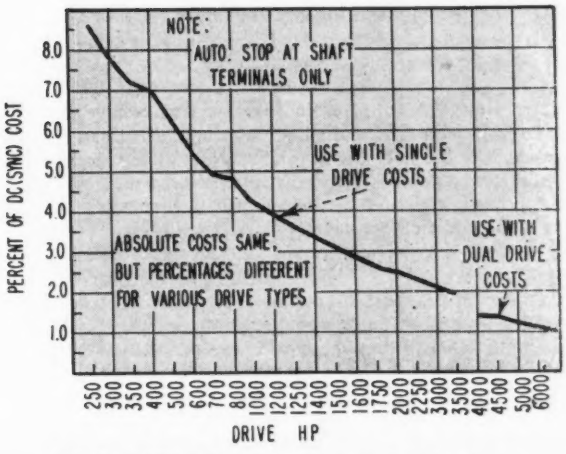

NOTE:
AUTO. STOP AT SHAFT TERMINALS ONLY
USE WITH SINGLE DRIVE COSTS
ABSOLUTE COSTS SAME, BUT PERCENTAGES DIFFERENT FOR VARIOUS DRIVE TYPES
USE WITH DUAL DRIVE COSTS
DRIVE HP
PERCENT OF DC(SYNC) COST

**Fig. 3.** Addition for automatic control on dc drives.

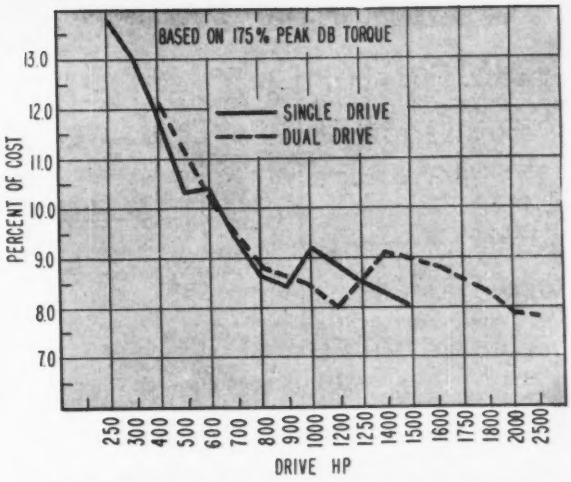



**Fig. 4.** Addition for dc dynamic braking on ac drives.

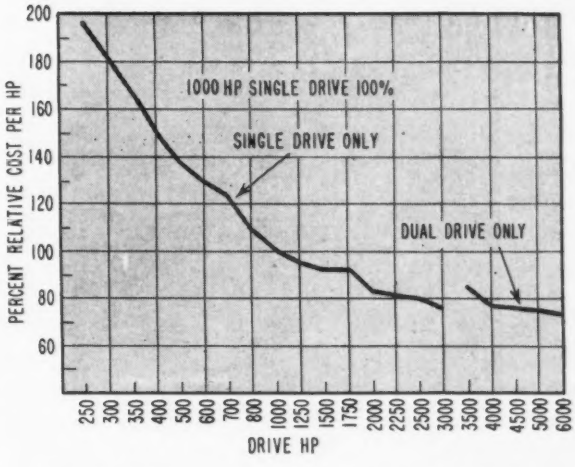



**Fig. 5.** Relative cost per hp vs hp for dc (sync) drives.

## Example illustrating use of Fig. 1-5 inclusive to determine relative drive costs.

Assume a given duty cycle calculation shows need for a 700 hp dc drive or an 800 hp ac drive. Compare relative first costs of the least expensive dc (sync) arrangement with the least expensive ac arrangement, including dc dynamic braking on the ac drive.

Fig. 2 shows that a single dc (sync) drive should be used, as a dual drive would be 5% more. From Fig. 5, the percent relative cost per hp is 123 for 700 hp single drive.

**Relative cost factor = 1.23 × 700 × 1.0 = 861.**

Fig. 2 shows that a dual ac drive is slightly less expensive than a single ac drive at 800 hp, the comparison factor being 97.5%. Fig. 1 shows that a single ac drive is 51% as expensive as a single dc drive at 800 hp. From Fig. 4, additions for dc dynamic braking are 8.6% and 8.8% respectively, for single and dual drives. Fig. 5 gives a relative cost per hp factor of 108% for 800 hp. Therefore, relative cost factors for ac drive are as follows:

**Single drive = 1.08 × 800 × .51 × 1.086 = 478.**

**Double drive = 1.08 × 800 × .51 × .975 × 1.088 = 467.**

Thus, it is seen that the comparison is between a dual ac drive and a single dc (sync) drive. The ac drive costs about (467/861) × 100 = 54.2% as much as the dc drive. Approximate knowledge of either cost in actual dollars would enable a swift evaluation of dollar differentials.

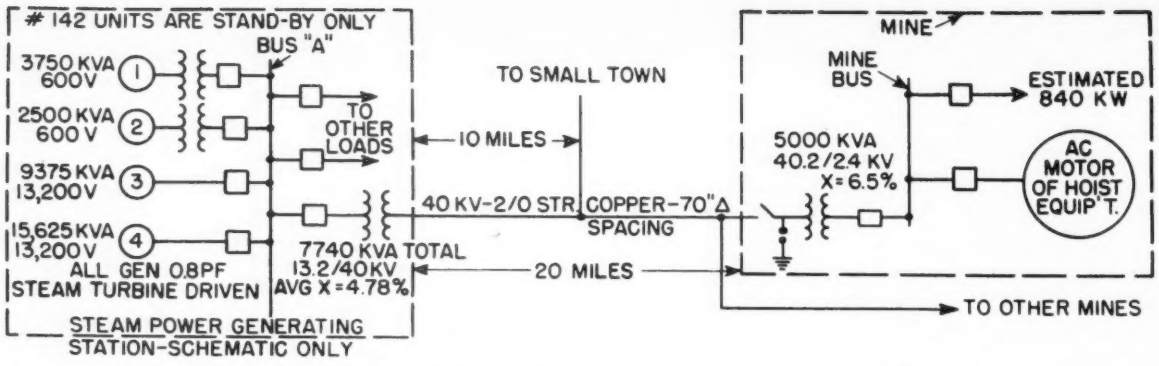



**Fig. 6.** Simplified one-line diagram of system for hoist duty cycle shown in Fig. 7.

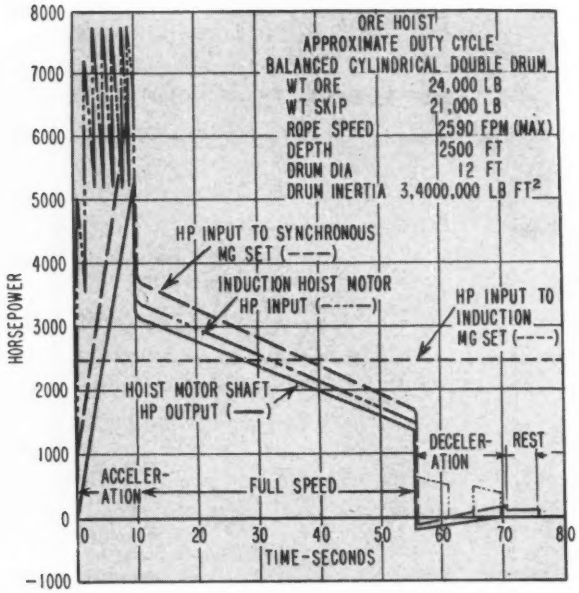



**Fig. 7.** Hoist duty cycles in terms of horsepower.

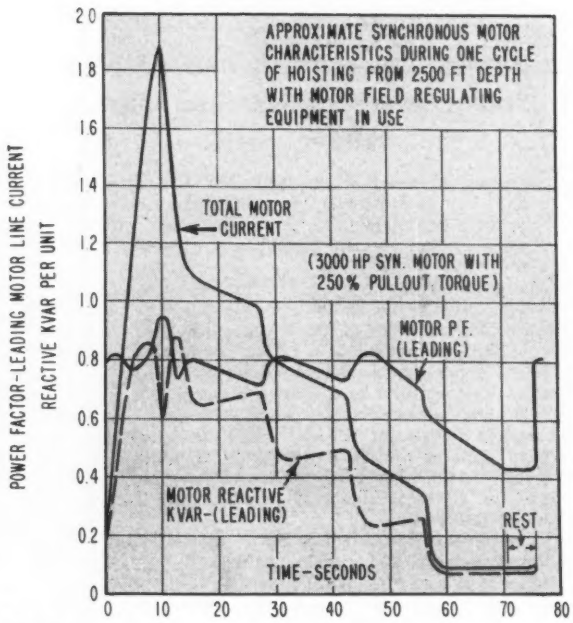

APPROXIMATE SYNCHRONOUS MOTOR CHARACTERISTICS DURING ONE CYCLE OF HOISTING FROM 2500 FT DEPTH WITH MOTOR FIELD REGULATING EQUIPMENT IN USE
TOTAL MOTOR CURRENT
(3000 HP SYN. MOTOR WITH 250% PULLOUT TORQUE)
MOTOR P.F. (LEADING)
MOTOR REACTIVE KVAR-(LEADING)
REST
TIME-SECONDS
POWER FACTOR-LEADING MOTOR LINE CURRENT
REACTIVE KVAR PER UNIT

**Fig. 8.** Hoist duty cycle in terms of input to synchronous motor terminals for synchronous MG set hoisting system.

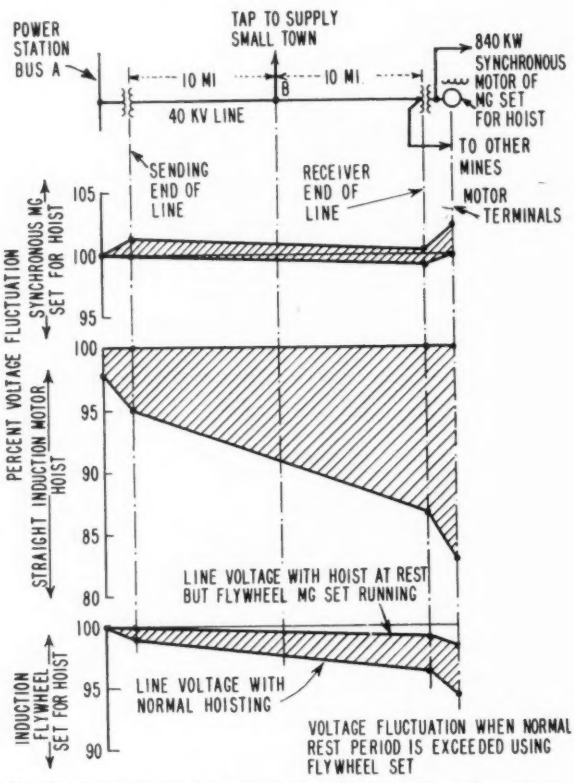

POWER STATION BUS A
TAP TO SUPPLY SMALL TOWN
10 MI
10 MI
40 KV LINE
840 KW SYNCHRONOUS MOTOR OF MG SET FOR HOIST
TO OTHER MINES
SENDING END OF LINE
RECEIVER END OF LINE
MOTOR TERMINALS
PERCENT VOLTAGE FLUCTUATION
SYNCHRONOUS MG SET FOR HOIST
STRAIGHT INDUCTION MOTOR HOIST
LINE VOLTAGE WITH HOIST AT REST BUT FLYWHEEL MG SET RUNNING
LINE VOLTAGE WITH NORMAL HOISTING
INDUCTION FLYWHEEL SET FOR HOIST
VOLTAGE FLUCTUATION WHEN NORMAL REST PERIOD IS EXCEEDED USING FLYWHEEL SET

**Fig. 9.** Comparison of power supply system voltage fluctuations for three types of mine hoist drives. (Loads of town and other mines not considered.)

above about 1500 hp, as in Fig. 2 on preceding page.

Overall economy of dual versus single drive can be observed only by factoring-in relative costs of the mechanical equipment obtained from hoist manufacturers. For example, gear savings on a dual drive will tend to offset greater costs for electric equipment.

## Automatic Control

On dc drives, cost of manual operation must be compared with cost of automatic operation. See Fig. 3. Cost of automatic control on a dc drive is independent of the drive hp rating, and is the same for dc (sync) or dc (FW) drives. For convenience the additional cost for automatic control in percent of the dc (sync) drive cost has been plotted against hp in Fig. 3. The cost varies from about 8.5% at 250 hp to about 1.0% at 6000 hp.

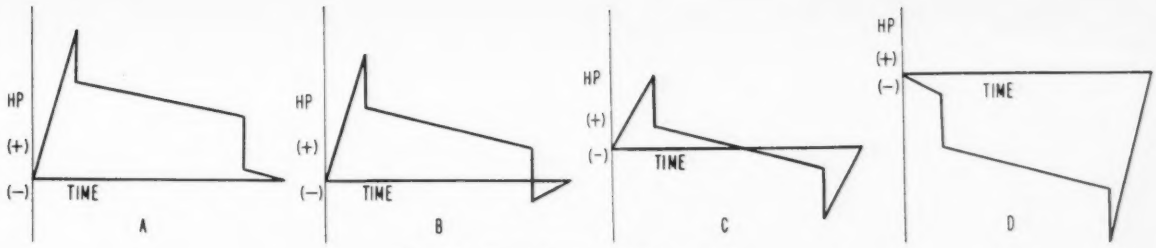



**Fig. 11.** Typical mine hoist duty cycles.

The automatic control relative costs shown apply to automatic stopping at shaft terminals only, as in the case of hoisting ore or men to a single stop at the surface from one or more levels in the mine. The problems, equipment complexity, and costs go up fast if it is required to run the hoist like an automatic elevator.

## DC Dynamic Braking

An increasingly popular feature on ac drives is dc dynamic braking for retardation or sub-synchronous speed control of overhauling loads. See Fig. 4 for additional costs. Between 250 hp and 2500 hp the additions average from about 14% to 8% for 175% peak torque. For greater or lesser values of peak torque, as may be required by the duty cycle, the costs will also be more or less than shown.

## Relative Cost Per HP Versus HP

It may also be desirable to compare relative costs of one hp rating against another. Fig. 5 shows relative costs per hp versus hp for dc (sync) drives, based on 1000 hp single drive as 100%. For the range of hp ratings shown, the cost per hp varies approximately 279% from minimum to maximum.

An example illustrating use of the curves of Fig. 1 through Fig. 5 follows:

## Adequacy of Power Supply System

Because of the cyclic nature of mine hoist loads with high peak demands in some cases, the choice of basic drive type is sometimes affected by the adequacy of the power supply system. In general there are two criteria to consider; maximum kw demand and voltage fluctuation.

If hoist peak loads added to other loads on the power supply system should cause the maximum capacity of prime movers (or steam boilers, water supply, etc.) to be exceeded, the prime movers will lose speed, and system frequency will decrease. Further, if rates of change of hoisting load should be faster than the prime mover speed-governors, there will be frequency swings on the power supply system. Under such conditions it may be necessary to relieve the system of such load conditions or to bolster power generating facilities. Some power rate contracts may require limitation of demand peaks even though the system frequency swings are not troublesome.

## Typical Hoisting Loads

Typical hoisting load characteristics are illustrated in Fig. 7, which applied to the study of an actual case. Note particularly the magnitude of the saw-toothed input curve for the ac drive, and the fast rate of load-application. Compare this with the smaller peak and gradual rate of load-application realized with dc (sync) drive. The constant power input curve for the dc (FW) drive indicates full equalization of the cycle at a demand appreciably less than either of the other two drive systems.

## Effect on Power Supply System

Of the three drive types under consideration the ac drive imposes the severest duty on the power supply system from the standpoint of both kw demand and voltage fluctuation. Least severe on the basis of the kw demand is the dc (FW) drive, with dc (sync) drive between the other two types. Theoretically, a fully equalized cycle with dc (FW) system will be the least troublesome from the standpoint of voltage fluctuation also, since the kw demand is constant. However, this ideal condition is not realized completely over long periods of time due to irregularities in hoisting requirements. Properly applied, the dc (sync) drive, equipped with automatic field control on the synchronous motor, may limit voltage fluctuation magnitude to values less than dc (FW) drive, or to entirely acceptable values. The smaller the amount of the voltage dips, the more frequently they may be tolerated. In a partially equalized cycle with dc (FW) drive, the load fluctuates during each hoisting trip; and because of power factor considerations, the voltage fluctuation may be greater than with dc (sync) drive equipped with automatic control of the synchronous motor field.

Fig. 6 is a simplified one-line diagram of an actual power supply system studied for the hoisting duty illustrated in Fig. 7. Approximate input characteristics of the synchronous motor for dc (sync) drive are given in Fig. 8, based on use of a simple, 5-point automatic control of the synchronous motor field. Note that the leading kvar curve is approximately proportional to the total motor current curve. The small voltage fluctuation resulting from this treatment is shown near the top of Fig. 9. Although coming less frequently, the voltage swings caused by unloading of the dc (FW) MG set motor are greater than those for the dc (sync) drive. Unsuitability of the ac drive on this particular application is evident from the very large voltage fluctuations shown.

## Partial Equalization

Partially equalized cycles should be compared with equalized cycles, if flywheel MG sets are indicated. Flywheels on mine hoist MG sets reduce power demand peak to acceptable levels. If demand requirements can be met by partial equalization, smaller flywheels can be used. This generally costs less.

One way to define the degree of equalization is to express it in percent. Full equalization, called 100%, involves maximum possible reduction of power input below the completely non-equalized peak. Partial equalization involves a lesser reduction of power input below the completely non-equalized peak. Percent equalization can then be defined as actual peak reduction times 100 divided by maximum possible peak reduction.

Fig. 10 illustrates the results of a study of a typical hoisting cycle (see p 88). The curves represent what might be expected in a qualitative way on any typical cycle. Note the rapid decrease in necessary flywheel size compared to decrease in percent equalization. In this case, 60% equalization can be realized with a ¼ size flywheel, and 80% equalization results from a 60% flywheel. Note that combined costs of flywheel and MG set motor are smaller for reduced equalization.

*(Continued on p 88)*

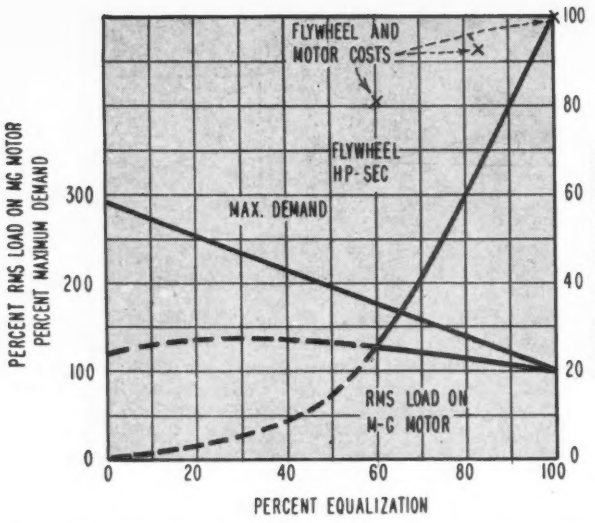

FLYWHEEL AND MOTOR COSTS
FLYWHEEL HP-SEC
MAX. DEMAND
RMS LOAD ON M-G MOTOR
PERCENT RMS LOAD ON MG MOTOR
PERCENT MAXIMUM DEMAND
PERCENT HP-SEC OF FLYWHEEL
PERCENT COST OF MG SET FLYWHEEL AND MOTOR
PERCENT EQUALIZATION

**Fig. 10.** Degree of equalization and its effect on other factors.

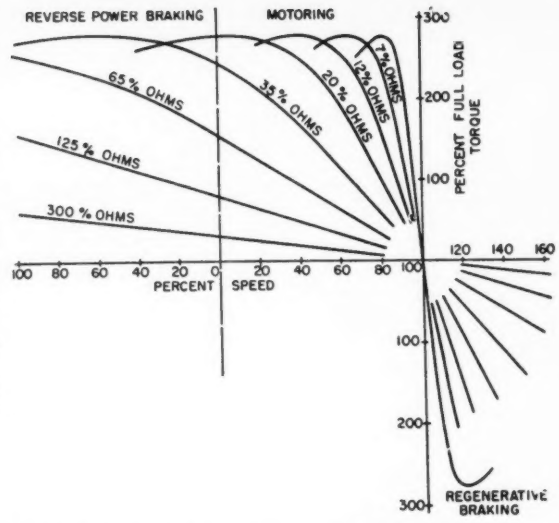



**Fig. 12.** Typical speed-torque curves for ac wound-rotor.

## Operating Characteristics

Operating characteristics required of a mine hoist drive are somewhat dependent on the nature of the duty. Typical hp-time duty cycles are shown in Fig. 11. Cycle A requires positive torque entirely; cycle B requires positive torque for all except retardation; cycle C starts out with positive torque, but shifts to negative torque entirely; cycle D requires negative torque entirely.

## Drive Characteristics

Basic drive characteristics for various cycle requirements are given in Fig. 12 and Fig. 13, for ac drive and dc drive, respectively. The dc characteristics obviously are superior from the standpoint of speed regulation and ability to afford electric braking at all speeds.

Whereas the dc system is well adapted to any of the four typical cycles of Fig. 11, the basic ac drive is lacking with respect to cycles C and D, where the load is overhauling before and during retardation. Reverse power braking, a severe and coarse means of control, would be required. This would be especially undesirable if speed control is needed at values below rated full speed.

Suitable braking characteristics for reduced speed control and retardation of overhauling loads can be obtained on ac drives, by adding dc dynamic braking equipment to the basic system. Characteristics obtainable by means of a simple and inexpensive type of dc dynamic braking are illustrated in Fig. 14 and 15. Fig. 14 applies to the lowering of a light load of men, for example, at approximately 50% speed. The overhauling load torque at beginning of descent is 25%, increasing due to rope overhang change to 50% at the end of travel. Fig. 15 illustrates the deceleration of an empty trip of cars (requiring 90% load torque) at the bottom of a slope. The average total torque during retardation is about 130%, giving an average decelerating torque of 40%.

## AC Versus DC Characteristics

No clear dividing line can be drawn between ac drives and dc drives for mine hoists on the basis of characteristics, due to the heavy weighting of first cost in favor of the ac drive. The desire to save on initial investment prompts many mining people to take a tolerant view of the ac drive's relative shortcomings. That this practical attitude is generally justifiable is borne out by the number of successful ac drives which outnumber dc hoist drives by about 5 or 6 to 1 above 200 hp. The increasing use of dc dynamic braking on ac hoists and the improvement in power supply systems are both tending to further reduce the need for dc systems. In general dc drives are coming to be reserved for large, high speed installations where production and operating efficiency are most important. This latter category includes automatic hoists, about which more will follow presently.

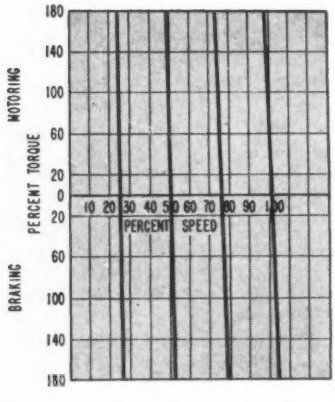



**Fig. 13.** Typical speed-torque curves for voltage-regulated dc Ward-Leonard drive.

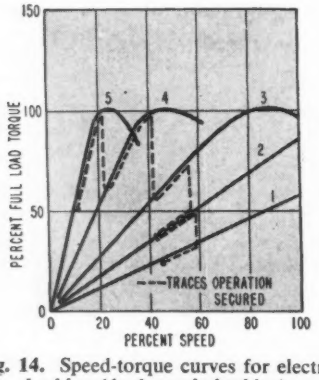



**Fig. 14.** Speed-torque curves for electric braking (dc dynamic braking).

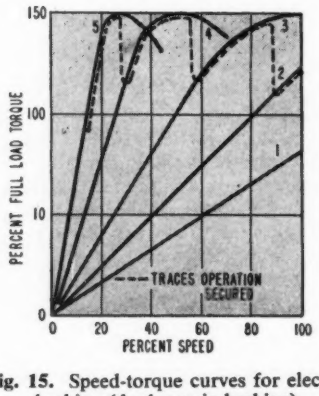



**Fig. 15.** Speed-torque curves for electric braking (dc dynamic braking).

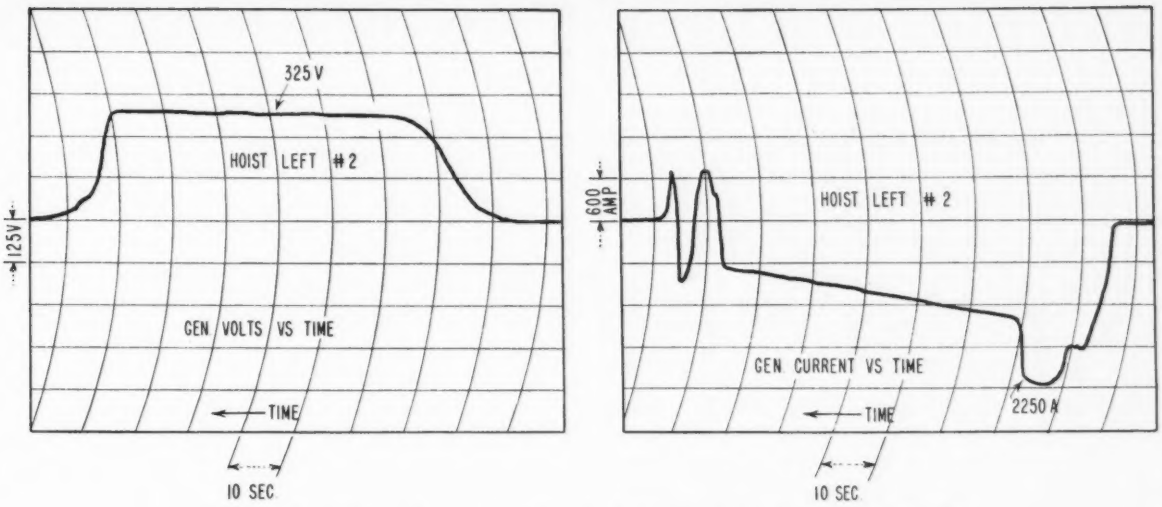



**Fig. 16.** Repetitive cycle on automatic mine hoist at potash mine, Carlsbad, N. M.

## Where Good Control is Needed

In evaluating suitability of hoist drive characteristics, consideration should be paid to the various phases of hoist operations where good control is important. Some of these operations are:

**1.** Entering and leaving dumping horns and loading mechanisms at controlled low speeds.

**2.** Approaching landing and entering terminal facilities, with torque requirements changing from negative to positive.

**3.** Spotting of multi-deck cages with speed and accuracy.

**4.** Reduced speed for handling of men, especially lowering out-of-balance.

**5.** Handling of heavy materials at reduced speeds, either lifting or lowering.

**6.** Changing levels out of balance in a multi-level, normally balanced system.

**7.** Low speed inspection of shaft and ropes.

**8.** Limiting acceleration peaks to reduce rope slippage on Koepe hoists.

**9.** Reducing hoist speed as unbalanced lowering load encounters sharp decrease in slope angle.

**10.** Automatic hoisting.

Consideration of factors such as these leads to selection of dc dynamic braking for ac drives or selection of dc drives, depending on objectives and personal points of view, usually based on experience.

## Automatic Hoists

Automatic hoists are in a class by themselves. Without an operator to integrate the variables and to make appropriate compensations, the automatic hoist drive demands the best of characteristics. On most installations, production is the keynote, and maximum economy of cycle time on a highly repetitive basis is necessary.

Two critical parts of an automatic cycle are the beginning and the end, the latter being the most difficult. A system having virtually flat speed-torque characteristics and rapid response is vital, due to the need for predictable and stable speeds for entering the terminal facilities, despite swings in load from negative to positive during a given retardation, and despite variations in skip loading. Good, slow-speed control also is needed for the leaving of loading mechanisms and dumping horns at the start of a trip.

The speed-torque curves of Fig. 13 show why the dc drive is well suited to automatic hoisting.

Fig. 16 shows dc volts and dc amperes on a typical cycle of an automatic hoist at a potash mine in Carlsbad, New Mexico. The volts represent speed, and the amperes represent load. The voltage trace illustrates smoothness of acceleration and deceleration, and excellent speed regulation.

## Operating Costs

Operating costs do not generally enter into the choice of drive systems for mine hoists, although they may help to settle the issue in close decisions. For purposes of this paper, let us consider power costs, operating labor costs, and maintenance costs.

## Power Costs

For a given duty cycle we can predict energy consumption and power demand rather accurately, but it is difficult to generalize. On an instantaneous demand basis, ac drive will be highest, dc (sync) next, and dc (FW) lowest. Therefore, if the power contract is affected by maximum instantaneous demand, ac drive would tend to cause the highest charge and dc (FW) would tend to cause the lowest charge, depending on the actual values.

If there is a power factor clause, the use of dc (sync) may show an advantage over the other two systems.

If demand is averaged over a period of time (15 min, for example) for rate purposes, the drive system having the lowest energy consumption also should have the lowest demand charge. In no case, will the dc (FW) drive have the lowest energy consumption; therefore, it does not necessarily turn out that the limiting of instantaneous demand peaks with flywheel MG sets will result in the lowest demand charge.

Lowest energy consumption will be obtained with either ac drive or dc (sync), depending on the duty cycle. Long full-speed times and long rest-times favor the ac drive, due to lower losses at full speed and practically no stand-by losses. Cycles having long accelerating and decelerating times in comparison to full speed and rest times favor dc drive, due to lack of rheostatic losses. Stand-by losses are relatively high due to running light losses of the MG set. Generally, then, short fast cycles favor dc drive, and long deep cycles favor ac drive from an energy consumption standpoint.

Dc (sync) drive overall efficiencies commonly run between 50 and 60%. Dc (FW) efficiencies usually are 6 to 10% less than the dc (sync) efficiencies. Ac drive efficien-

*(Continued on p 92)*

# Basic Break-Even Formulas Devised To Simplify Mine Evaluation

H. M. CALLAWAY, Morristown, Tenn.

APPLICATION OF GEOLOGY in the interest of ore-search is controlled strictly by economic considerations. The word ore itself is an economic definition. Therefore, those who search for ore must consider economic factors that define it.

How many tons of what grade ore must be proved up by drilling to warrant development? At what point should drilling be concluded and sinking initiated? What grade of mineral constitutes ore in any specific operation? What is the economic worth of a given orebody? The following formulas were developed in an attempt to answer these, and similar questions.

The premise is that the break-even point can be used as a reference to analyze many mining economic problems. Though the formulas are tailored specfically to conditions in the Tri-State Zinc District, similar formulas can be derived to satisfy the factors of any mining operation.

## Definitions

In order to break even, the total cost of production must exactly equal the total market value of the product. For purposes of analysis, however, we may examine the relation of unit cost to unit value of the product without destroying the validity of the break-even expression. Thus, to break even on the mining and milling of one ton of ore, the cost must exactly equal the dollar value of the concentrate extracted from that ton.

A digression is necessary, here, to define a term that is most helpful in establishing dollar-value of ore. *Recovery*, as used in the Tri-State District, is defined as the ratio of the weight of the sulfide concentrate (C) to the weight of the mill heads from which the concentrate is extracted (H).

$$R = \frac{C}{H}$$

If we set H equal to one ton of ore, the value of R becomes the percent of that ton which, on being processed, reports as a marketable concentrate.

It is desirable to express recovery (R) in a more useful form, using assay values rather than weights to define it.[1]

By definition, $R = \frac{C}{H}$

Let: H = weight of mill heads
T = weight of mill tails
C = weight of concentrates
h = assay of heads
t = assay of tails
c = assay of concentrates

obviously, $H = C + T$ (1)

and $Hh = Cc + Tt$ (2)

multiply (1) by t $Ht = Ct + Tt$ (3)

subtract (3) from (2) $Hh - Ht = Cc - Ct$ to eliminate Tt (4)

or $H(h-t) = C(c-t)$

rearranging $\frac{C}{H} = \frac{h-t}{c-t} = R$, by definition

Thus, Recovery $= \frac{h-t}{c-t}$

## Development of Formulas

If SP is the market price, in dollars, for a ton of concentrates and R is the recovery value of one ton of ore, then (SP x R) is the dollar value of the ton of ore. Equating this value to the total cost of mining and milling the ton of ore, we have the break-even expression—

$$SP \times R = C$$

Let:
C = Total cost per rock ton.
Cmm = Mining and milling cost per rock ton.
Cr = Royalty cost per rock ton.
R = Recovery expressed as a decimal fraction. R is equal to $\frac{G-t}{c-t}$ where G is equal to mine grade or assay of the mill heads (h), t is equal to the assay of mill tails, and c equals the assay of the concentrate produced.
SP = Market value of the concentrates expressed in dollars.
r = Royalty expressed as a decimal fraction and paid to the landowner as a percent of the value of the concentrates derived from ore mined from his property. On reflection, it can be seen that the royalty cost, Cr, for one ton or ore will equal $SP \times R \times r$ which, in turn is equal to $SP \times r \times \frac{G-t}{c-t}$.

To break even — $SP \times R = C$

or $SP = \frac{C}{R}$

$$SP = \frac{Cmm + Cr}{\frac{G-t}{c-t}}$$

$$SP = \frac{Cmm + r \times SP \times \frac{G-t}{c-t}}{\frac{G-t}{c-t}}$$

$$SP = \frac{\frac{Cmm(c-t)}{c-t} + r \times \frac{SP(G-t)}{c-t}}{\frac{G-t}{c-t}}$$

$$SP = \frac{Cmm(c-t) + r \times SP(G-t)}{G-t}$$

$$SP = \frac{Cmm(c-t)}{G-t} + \frac{r \times SP(G-t)}{G-t}$$

$$SP = \frac{Cmm(c-t)}{G-t} + r \times SP$$

$$SP - r \times SP = \frac{Cmm(c-t)}{G-t}$$

$$SP(1-r) = \frac{Cmm(c-t)}{G-t}$$

**Formula No. 1** $SP = \frac{Cmm(c-t)}{(G-t)(1-r)}$

Knowing the mining and milling cost, mill assay values, mine grade and percent royalty for a given operation, the market value below which the operation will lose money can be calculated.

Solving Formula No. 1 for G:

**Formula No. 2** $G = \frac{Cmm(c-t)}{SP(1-r)} + t$

Assuming a stable market price for concentrates and knowing mill assay values, mining and milling cost and percent

[1] This proof appears in an unpublished report by F. J. Cuddeback, The Eagle-Picher Co., M & S Div., Tri-State Mines. Taggart's *Handbook of Ore Dressing* carries similar proofs.

royalty for a given operation, the mine grade below which the operation cannot show a profit can be calculated.

Solving Formula No. 1 for the value Cmm:

**Formula No. 3.**

$$Cmm = \frac{SP(G-t)\ \ (1-r)}{c-t}$$

Assuming a stable market price for concentrates and knowing the mill assay values, the percent royalty and the mine grade of a given operation, the mining and milling cost above which the operation cannot economically operate can be calculated.

## Formula Examples

The following problems are presented to demonstrate the use of the break-even formulas. No example is given for use of Formula No. 1 because its use is quite direct. In times of a falling market it serves to forecast the danger point and allow for adequate planning. Formula No. 1 forecasts also the market conditions under which non-economic properties may become productive.

**Problem:**

A mine is offered for sale. Geologists estimate the ore reserves at 480,000 tons of 4.81% ZnS. Mining operators estimate the ore can be mined for $3.30 per ton. It is desired to maintain a 12% dividend to stockholders. The market price is expected to remain stable at $100 per ton of 60% Zn concentrate. The mill tailings run 1% ZnS. Royalty is 6% of mill output. What is the highest price that should be offered for the mine? Assume an expected mining rate of 20,000 tons per month.

**Using Formula No. 3,** we establish the cost per rock ton above which the operation would show a loss.

$$Cmm = \frac{SP(G-t)\ (1-r)}{c-t}$$

$$Cmm = \frac{100(.0481-.01)\ (1-.06)}{.894-.01}$$

$$Cmm = \frac{100\times.0381\times.94}{.884}$$

Cmm = $4.05 per ton

Estimated cost of mining and milling is $3.30 per rock ton and the break-even cost of mining and milling is $4.05 per rock ton. Then the difference of $0.75 per rock ton will be realized over and above mining and milling cost. There are 480,000 tons; therefore, 480,000 x 0.75 = $360,000 total to be realized in mining the entire orebody.

It is desired to pay the stockholder 12% per annum: At a mining rate of 20,000 tons per month the life of the mine would be two years. Therefore, 2 x 12% equals 24% of the total investment that must be assigned to dividends.

Let X = purchase price

$X + .24X = \$360,000$

$1.24X = \$360,000$

$$X = \frac{360,000}{1.24}$$

$X = \$290,300$

Then, $290,300 is the highest price that can reasonably be offered for the property.[2]

**Problem:**

An extensive orebody containing both high and low grade blocks is to be developed and mined. The initial cost of surface installations, haulage roads, and shaft sinking is $550,000. It is desired to write off the amount in 4 years and at the same time pay a 12% divended to stockholders. The mill and mining plan is set up for 20,000 tons per month. What average grade ore is it necessary to mine in order that the operation meet its obligations? Assume that the market price of concentrates is expected to average $100 over the 4-year write-off period. Laboratory experiments indicate that the mill will turn out a 60% Zn concentrate with a tailing that will run 1% ZnS. Royalty to land owners is contracted at 8% of mill output. It is estimated that mining and milling cost will be approximately $3.05 per ton.

[2] Obviously, this problem does not take into consideration the value of the geologic possibility of extending the orebody.

**Solution:**

20,000 tons per month
48 months to write off $550,000
20,000 × 48 = 960,000 tons

**Factor (1)**

$$\frac{\$550,000}{960,000\ \text{tons}} = \$0.573\ \text{per ton for write-off}$$

Total amount of capital invested on which it is desired to pay 12% is the $550,000 initial cost of development plus $200,000 operating credit = total $750,000.

12% of $750,000 = $90,000 per year
For four years = $90,000 × 4 = $360,000 for dividends

**Factor (2)**

$$\frac{\$360,000}{960,000\ \text{tons}} = \$0.375\ \text{per ton for dividends}$$

The above cost factors (1) and (2) can be added to Cmm in order to arrive at a total cost figure. In like manner, any other cost that can be estimated or calculated, such as taxes, may be added.

**Total C will then equal:**

| | |
|---|---|
| Factor (1) | $0.573 |
| Factor (2) | $0.375 |
| Cmm | $3.050 |
| Total C = | $3.998 = $4 per ton |

**Using Formula No. 2:**

$$G = \frac{C(c-t)}{SP(1-r)} + t$$

$$G = \frac{4.00\times(.894-.01)}{100\times(1-.08)} + .01$$

$$G = \frac{4.00\times.884}{92} + .01$$

G = .0384 + .01
G = 4.84% ZnS

Then 4.84% is the grade of ore necessary to be maintained if the operation is to satisfy all its obligations. If the conditions of the problem change after the operation is initiated a recalculation will establish a corrected value of G.

**Problem:**

A drilling project has proved up 80,000 tons of ore that averages 4.75% ZnS. Geologically, the orebody seems to be continuous, but it is narrow and costly to follow by drilling. Cost of sinking a shaft, initial power and haulage installations and various surface buildings is estimated at $100,000. Cost per rock ton after the initial outlay is estimated to be $2 per ton. Does the amount and grade of ore already proved up justify the expense of development? Should drilling be continued? Should the lease be relinquished?

**Assumptions:**

Market price of concentrates is stable at $100. (SP)
Royalty = r = .06
Assay of concentrates = .894 ZnS (equivalent to 60% Zn)
Assay of mill tails = .01 ZnS

**Using formula No. 3,** we establish the cost per rock ton above which the operation would show a loss.

$$Cmm = \frac{SP(G-t)\ (1-r)}{ct}$$

$$Cmm = \frac{100(.0475-.01)\ (1-.06)}{.894-.01}$$

$$Cmm = \frac{100\times.0375\times.94}{.884}$$

$$Cmm = \frac{3.525}{0.884} = 3.988 = \text{approximately \$4.00 per ton}$$

Then, temporarily ignoring the initial cost of development, the deposit could be economically mined at any cost below $4 per ton. According to estimates, the orebody in question can be mined at $2 per ton. Then $4 — $2 = $2 per ton that will be realized once development is completed.

There are 80,000 proved tons of ore; hence 80,000 x $2 = $160,000. This figure represents the ultimate worth of the proved ore. The initial cost of development is $100,000. Therefore, the orebody can be mined with an expected ultimate profit of $60,000.

## Property Net Worth

The present writer understands that the Hoskold's annuity formula in some form similar to that stated below is in wide use in the mining industry for evaluation of mining property.

$$P = a\frac{(1+r_1)^n - 1}{r_2(1+r_1)^n - r_2 + r_1}$$

P = purchase price or net worth in dollars.

a = net annual income expected from the property.

n = number of years life of the property.

$r_2$ = the rate of interest purchaser wants from his investment.

$r_1$ = the rate of interest which can be obtained on money placed in a sinking fund that will in *n* years replace the purchase price.

There are several major differences in the method of approach to the evaluation problem using the break-even formulas. From the type problems previously given, it can be seen that the interest an investor wants ($r_2$) entered the break-even calculations as a component of total cost. It also is noted that net annual income figures (a) are not needed. The number of year's life of the property (n) enters the break-even analysis more directly as a mining rate.

Before the Hoskold formula can be used, it is necessary to establish a value for all the factors entering into the break-even calculations; otherwise, the net annual income figure (a) cannot be determined.

The most significant difference in the two methods arises from the fact that the break-even calculations do not include any consideration of interest on money marked for the sinking fund (Hoskold's factor, $r_1$). To account this interest as a factor of the purchase price is to charge one investment with gains or losses of another.

The present writer believes the disposition of money marked for the sinking fund represents an entirely separate investment which must stand on its own economic worthiness; it should have no relation to any previous investment from which the investing money is derived.

Because of this concept, the net worth of a mineral property, as determined by the break-even formulas, is less than the purchase price determined by the Hoskold formula by an amount equal to the loss of expected interest from the sinking fund.

## Conclusion

The writer believes that the diversity of application, and the more conservative and direct determination of net worth should render the break-even formulas useful in solving the economics of many mining and geologic problems.

## Complicated Mine Valuation Rigmarole Is on the Wane—Says Reviewer

Dear Sir:

Referring to the "break-even" concept of valuation in Callaway's paper, I must say that I share his views in regard to the sinking fund aspect of the Hoskold formula.

Contrary to Callaway's understanding, I do not believe that mining companies use the Hoskold formula very much, or any other complicated rigmarole of valuation except in those rare cases where a property changes hands, about which a great deal is known and where a long period is required for payout. In most cases of properties which have never reached the production stage, much of the concept of worth has to be based on a geological guess as to what lies beyond the points of observation. Even in a partially developed property, the geologist or engineer will come up with guesses as to tonnage classified as measured, indicated and inferred or some similar designation. What would one do with the tonnages given in the less certain classifications? I think that in the typical case, the mining company looks at the observed evidence, and calculates the apparent operating profits and geological possibilities. If two-thirds of operating profits will recoup the investment in five years or less and the geological possibilities are good, the property is attractive, otherwise not.

In brief, the mining company expects a fast enough return of its investment that such points as interest to stockholders or interest on invested capital are rather academic. The latter does, however, become important in such a case as a porphyry copper where a large investment and a long payout are anticipated.

More formal valuations are rather for purposes of adjudication, division of inheritances or justification of bureaucratic or an executor's decision. In such areas they have a proper place. Thus, criticizing Callaway's paper in this light, I would say that he cannot ignore amortization and interest on unrecouped investment as he appears to do. Also, if stockholders must be considered as entitled to a specific dividend expressed as a percentage of the investment, it does not seem fair to the property not to allow for that portion which is recouped from year to year. It is also true that this formula, like the Hoskold formula, implies that an engineer can successfully guess at prices and operating costs over a period of years.

In any such paper addressed to a general audience, it is improper to use the Tri-State definition of "recovery". He should convert his formula in this respect to ratio of concentration, which is a proper and generally understood term.

Sincerely,
EVAN JUST
*Vice President*
*Cyprus Mines Corporation*

---

## Hoist Motors (*continued from p 89*)

cies cover a wide range, and can go as low at 35% on short fast cycles.

### Operating Labor and Maintenance Costs

From the standpoint of operating labor costs, there is little difference in the three systems, unless automatic operation is to be considered. In this case, either dc system shows an advantage over the ac system because the dc drive is more suitable for automatic unattended operation.

Highest maintenance costs will be incurred by the dc (FW) system, due to attention required by the liquid slip regulator. It would appear to be about a toss-up between ac drive and dc (sync) drive, although the emphasis is placed differently. In the ac drive, control devices are subjected to rather severe duty. Duty is relatively light on the control for a dc (sync) drive. There are more rotating machines, some with commutators and brushes, in the dc (sync) system. Even so, properly designed machines should require little attention when used within ratings. Mechanical maintenance should be less for dc drive because brake wear is less.

**1.** Because of large initial cost savings, first thought should be given to ac drive. This should be the ultimate choice unless more expensive equipment is justified due to power system limitations, or need for better characteristics.

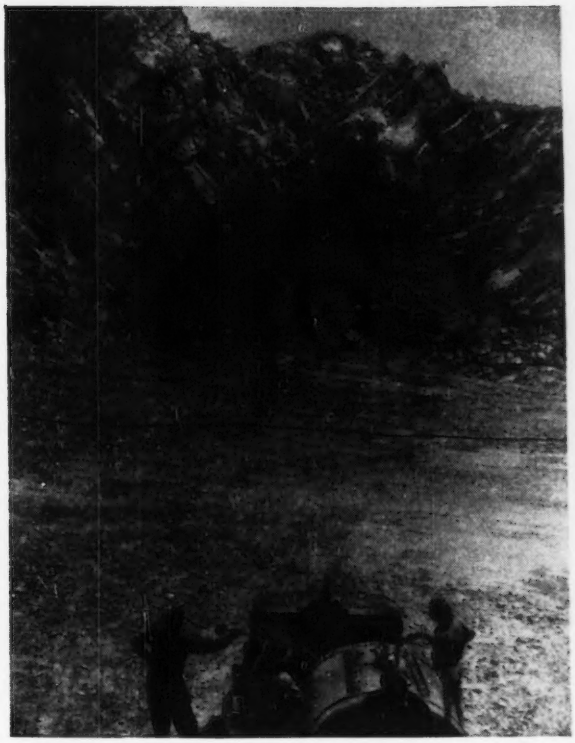
**2.** If power supply system is limited, think of dc (sync) drive before dc (FW). Resort to dc (FW) only after study shows dc (sync) unable to meet requirements. Dc (sync) may actually do a better job of limiting voltage fluctuations.

**3.** If operating characteristic improvements are needed, think first of adding dc dynamic braking to ac drive. However, do not compromise too far on desired characteristics or it may adversely affect production rate, costs, safety, etc. If dc dynamic braking seems inadequate, select dc drive.

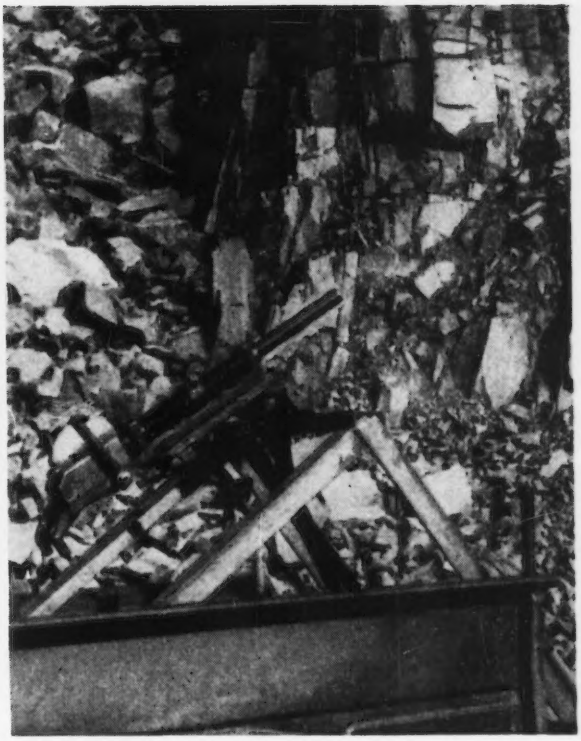
**4.** For the large, high production or otherwise very important installations, consider dc drive. This applies especially to automatic hoists.

**5.** If the decision is hard to make on the basis of first cost, power supply system, and operating characteristics, take a look at the expected operating costs.

**6.** Evaluate the differentials in first costs against other requirements to eliminate unsuitable alternatives early. Various curves and tables included herein will help.



**QUARRY CREW STANDS BACK** while an industrial gun fires at overhanging slab marked by puff at upper right.



**THIS IS THE INDUSTRIAL GUN** that can be used to dislodge overhangs, break boulders, and scale roofs underground.

# Quarry Gun Shoots Down Loose Overhangs

W. G. DAVIS
Special Representative
Remington Arms Co.

A BRAND NEW HEAVY POWER SHOVEL was the target of a rock slab which loosened and rolled unexpectedly down the pit face of a Western operation resulting in damage of $4,000. When this matter came up at a subsequent staff meeeting, the superintendent of the kiln plant asked the quarry superintendent jokingly "why don't you use my industrial gun to shoot down those overhangs?" The quarry crew tried it, and during the past five years they have had no accidents from a similar cause.

The Remington Industrial Gun used is built like an artillery piece weighing about 176 lb. It shoots a slug from an 8-gage shell with a "muzzle energy" of about 7475 ft-lb—i.e. the energy generated by dropping a 7475-lb weight 1 ft. At 150 ft, this energy drops to 5684 ft-lb which is still a lot of pounding to pack in a little missile.

In actual practice the quarry operators shoot about 10 shots at the point where a suspected overhang appears to be attached to the face. If this fails to dislodge the rock or slab, another shot is directed "right on the nose" to drive it back. Failure of the hazard to drop under this treatment is usually sufficient evidence that the rock is secure. Sometimes as much as 70 tons of rock may be brought down with the quarry gun.

The guns are presently leased to users in the United States for a nominal annual fee, but are sold outright to foreign users. Foreign use of the gun has become widespread, particularly by cement plants to dislodge build-ups in the rotary kilns, and to bring down hang-ups in the quarry. The over-sized 8-gage shot shells for which these guns are chambered, are packed 250 to a case, and are the only ammunition item sold by Remington Arms Co. direct to users.

The superintendent of an underground mine in the Southeast reports that the industrial gun has made operations safer, and has certainly raised the morale of the workmen.

A quarry superintendent said that the cost of removing overhangs from the quarry was formerly $85 each. The industrial gun cut this cost to $9.50 per overhang.

A trap-rock quarry producing ballast for railroads used the gun to bring down slabs of rock which remained dangerously upright after a blast had been set off.

An insurance executive points out that just one accident to an employee, or damage to heavy equipment due to the fall of an overhang may run insurance premiums up to many times the cost of the industrial gun.

Besides being used in underground mines, quarries, and kilns, the industrial gun has been used to shoot down old scaffolding in a mine; to free ships imbedded overnight in ice; to break up slag piles; to release bulk materials stuck up in storage silos; and to unclog mine chutes. One mine used the gun to crack up boulders which were too large to pass through grizzlies.

With safety to employees becoming more significant, use of industrial guns is pyramiding. The use by quarries which began only five years ago, is now quite widespread and growing. In fact the industrial gun is now ranked with other rock scaling equipment such as boom-type scaling rigs with self-leveling platforms, conventional fork-lift trucks with remotely controlled platforms, rigs with telescopic towers, lightweight scaling bars, specialized types of scaling ladders, and several types of mechanical scalers.

**SURFACE PLANT OF KONGSBERG SOLVVERK** includes offices (left to right), mill, extraction plant, refinery, shops, change house and bath house, and mine portal which appears at the extreme right.

**HARALD N. ROSS,** general manager, Kongsberg Sölvverk, 330-year-old silver property.

# 330 Years of Mining at Kongsberg

HARALD N. ROSS
General Manager
Kongsberg Sölvverk, Norway.

IN THE HEART of a mountainous timber district, some 60 mi southwest of Oslo, lies the 330-year old mining town of Kongsberg. With a population of 8000, it has not—even in our modern day—quite lost the distinction it enjoyed when Kongsberg, with 7000 inhabitants, was Norway's second largest town. In those days life of the town centered about Kongsberg Sölvverk, the State-owned silver mines of Kongsberg. More than 4000 of the town's inhabitants were employed by the mines. Today, with less than 200 employees, Kongsberg Sölvverk is no longer a prominent factor in the economic life of the town. Still, as a cultural factor the old Sölvverk attracts more than 30,000 visitors per year, who come to see the silver mine's Technical Museum — displaying the world's most exquisite collection of native silver—or to take a trip underground with the mine train, to old parts of the mines, where the installations are kept in running order for demonstration purposes.

In other parts of the mines, production wheels are still turning, even if reluctantly, creaking with old age. Silver ore is still coming out of the mines slowly, and year by year 4 to 5 tons of fine silver from the refinery is added to the total output which through the centuries has exceeded 1,300 tons.

## About the Author

Mr. Ross graduated from Norges Tekniske Högskole as a mining engineer in 1931. He served as assistant manager of Longyearbyen coal mines, Spitzbergen, for 9 years. During World War II he fought as an officer in the Norwegian Army in Spitzbergen, and was awarded the British M.B.E. and the Norwegian War Medal. In 1946 he became superintendent of mines at Kongsberg Sölvverk, and in 1949 general manager of the entire operation.

The foregoing facts about Mr. Ross were sent in by Mr. C. C. Austin, retired general manager of the Mancha Division, Goodman Manufacturing Co., who toured Norway last year.

## Geology

The silver mines of Kongsberg are situated in the Pre-cambrian Kongsberg-Bamle formation, locally represented chiefly by banded gneisses and dioritic gneisses. Local strike is uniformly about S-N, the dip is 70-80 deg east. Characteristic is the occurrence of amphibolitic dikes—the so called Vinor amphibolites—with strike varying around N-S and varying dip. The silver occurrence is apparently related to these dikes, and silver has never been found very far from the Vinor amphibolites in this area.

Another characteristic of the region

### Fig. 3. Total Silver Production 1623-1953

| Period | Number of years | Production: Total tons | Production: Average tons/year | Notes |
|---|---|---|---|---|
| 1623–1805 | 182 | 552.7 | 2.87 | Chiefly under Danish State management |
| 1805–1830 | 25 | 15.0 | — | Mining discontinued 1805–1815<br>Development only 1815–1830 |
| 1830–1953 | 123 | 748.5 | 6.08 | Norwegian State management |
| 1623–1953 | 330 | 1316.2 | 3.99 | |
| Effective years of Production | 305 | 1301.2 | 4.27 | Period 1805–1830 deducted |

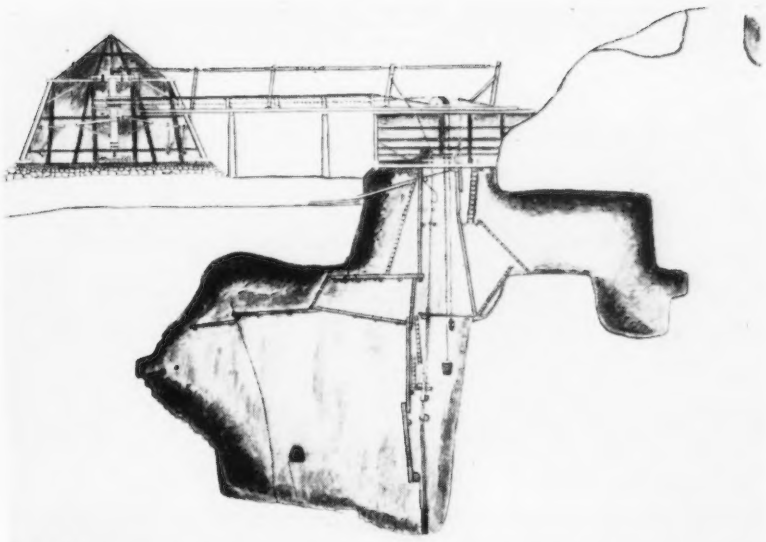


**FIG. 1. OLD DRAWING FROM THE ARCHIVES OF KONGSBERG SOLVVERK** shows how water power was harnessed and transmitted to mine workings to hoist ore during the early years of the enterprise.

is the so called "fahlbands," long narrow zones where the rocks have been metasomatically changed and impregnated with various pyritic minerals. Strike and dip of the fahlbands are very much the same as those of the rocks. In the Kongsberg area, two fahlbands are of prime importance, varying from 500 to 3000 ft in width and with a length of more than 5 mi. Silver occurrence is closely associated with the fahlbands, and all the mines are situated within the fahlband zones.

Crossing the formation with an E-W strike and a very steep southerly dip is a series of diabase dikes from the Oslo area, also a series of veins, running more or less parallel to the dikes. The veins are of two kinds: oldest are sulphide-bearing quartz-breccia veins, which strike over very great lengths, youngest are calcite veins with sporadic sulphides and arsenides, and with native silver and argentite. The latter are confined to the fahlbands, and are comparatively short. The quartz veins generally occur as single veins, 25 to 30 in. thick, whereas the calcite veins usually occur in systems en echelon—"fliederspalten"—the thickness of each vein seldom exceeding 4-5 in. However, this does not exclude single veins of the calcite type. On the contrary, very much of the richest silver has been mined on single calcite veins—the so called "main veins"—usually deposited as a second generation of precipitation on reopened quartz veins.

Silver occurs chiefly as native silver, occasionally as argentite. Often it is found in vugs in the veins as beautiful threads and crystals, but most of the mine's production comes from inconspicuous impregnations in side rock.

Although silver in the Kongsberg area is closely connected with the fahlbands and no silver is known to have been found outside these, not all fahlbands will contain silver-bearing veins. A fahlband containing silver veins is called an "ore band," and the old Kongsberg rule says: "The veins will be silver-bearing only where they cross an ore band." As an empirical rule it has been the leading one for silver mining in this area. All development workings bear evidence, characterized by E-W drifts, S-N crosscuts, and nearly vertical winzes and raises, always following the strike and dip of veins or fahlbands.

It appears, however, that the silver-bearing "ore-bands" might be more closely connected with the Vinor amphibolites than the rest of the fahlbands. Hence the second Kongsberg rule, stating: "With no Vinor amphibolite in the proximity, a vein will carry no silver." This rule in support of the old Kongsberg rule may help in the future search for silver in the Kongsberg area.

## History

The silver mines of Kongsberg, Kongsberg Sölvverk, were established in 1623, when occurrences of native silver (which had undoubtedly been known and worked in secret for centuries before), were officially found. As legend goes, the silver was discovered by an ox rubbing its horn on the rock, thus uncovering the glistening metal.

Early expectations were optimistic, but initial costs were large and production modest, thus the Crown, which had arbitrarily seized the deposits, did not find profits as expected. Consequently the ownership was transferred to a share-holding company in 1627. Under this management the mines were worked at a profit. For this reason, but under other pretenses—the mines were taken back by the Crown in 1661.

Number of workers during this period was about 100, but under management by the State government, it increased to about 500.

However, the mines gradually fell back to working at a loss, and they were sold. During the following 10 years of private ownership the mines were worked at a considerable profit. But in 1683 the Crown annulled the deal, recovered the mines, and claimed mismanagement as the reason for its high-handed proceedings.

A coherent period of State management followed which lasted to 1805. It was initiated by a period of increasing profits under management of Heinrich Schlanbusch, an able German mining engineer, who was called to Kongsberg by the King. However, after Schlanbusch, the status quickly deteriorated again. The bottom was reached in 1731, but this time all endeavors to sell the mines proved in vain.

The King once more turned to the Germans. A new commission of German miners was called to Kongsberg, among them Joachim Andreas Stuckenbrock, who later was to become "Oberberghauptmann" and superintendent of the silver mines. Under his efficient management, production reached unanticipated heights.

After Stuckenbrock, production continued to increase. By 1771 it reached 8.5 tons. Workers numbered more than 4000, in over 78 mines in the district.

After 1770, silver mines experienced a decline, chiefly because of earlier petty politics and lack of foresight. Schlanbusch had anticipated this development, and had made plans to forestall it. But employment of his plans was delayed, and when Stuckenbrock finally enforced the plans, it was too late. Many new mines had to be opened to keep up production, theft and dishonesty flourished, and mining began to suffer alarming losses.

By the end of the century the production dropped to 2.5 tons a year, the same as it had been at the beginning of the century.

In 1805 the mine was closed by order from Copenhagen. This order came as a shock to the local administration. A struggle to resume mining was immediately intiated, finally lead-

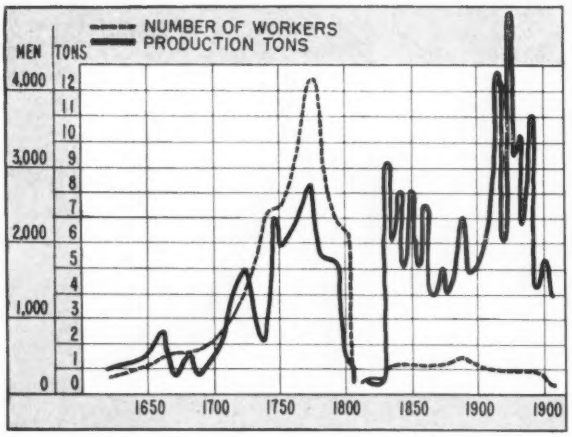



Fig. 2. Number of workers and production, 1623-1953.

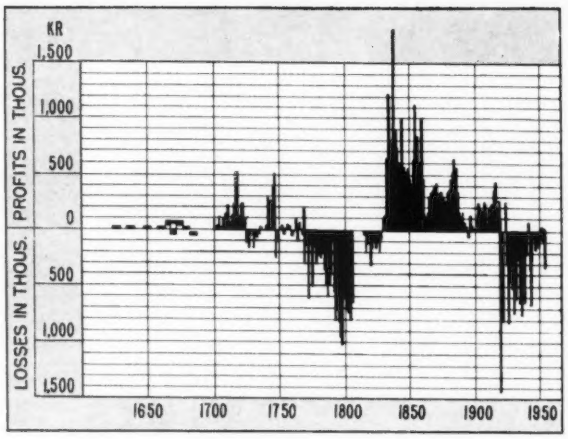



FIG. 4. Profits and losses 1623-1953.

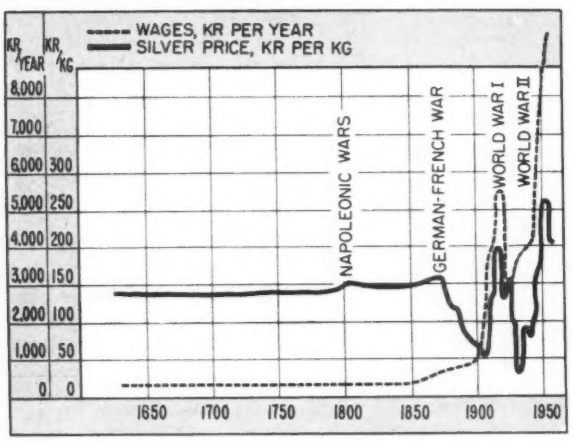



FIG. 5. Wages and silver prices 1623-1953.

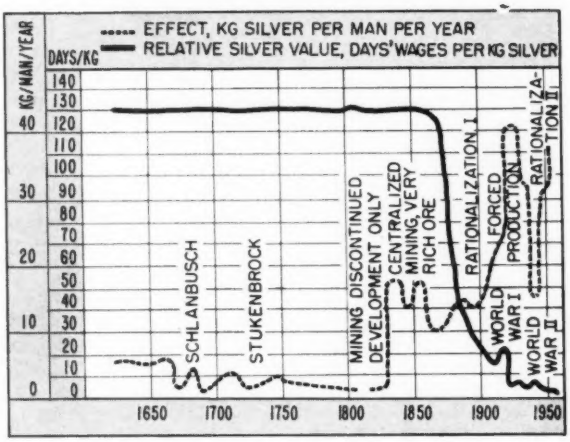



FIG. 6. Production and relative silver values 1623-1953.

ing to success. In 1814, by the treaty of Kiel, the more than 400-year-old union between Denmark and Norway was severed, and Norway was forced into a union with Sweden. But in the meantime Norway had made its own constitution, and was thus able to enter the new union as an independent and autonomous partner. The newly elected Norwegian "Storting" (parliament) decided to open the silver mines as Kongsberg. Main tunnels were extended into the old orebodies, at a depth of nearly 1000 ft below surface.

For nearly 15 years they worked on hope and faith, without finding any silver. At last it was decided to abandon work and sell the mines. Negotiations for sale were under way when rich ore was struck. The negotiations were called off, and in two years all expenses for 15 years' development work were paid back!

Profits for the period 1830 to 1888 averaged 100% of all costs.

From 1889 the mine proper has worked at a loss, but up to 1920, losses were balanced by forestry profits from 40,000 acres of timber that belong to the mines. But from then on even the yearly combined balance sheets with few exceptions came out with a deficit.

A constant struggle has been waged to beat these losses, and results from the last 2-3 years seem to indicate a slight possibility of success.

## Technical Development

When Kongsberg Sölvverk was founded in 1623, only primitive mining methods were known. All advancements were achieved by the burning method, of which the old mines still give telltale evidence. Firewood was lighted against the rock wall. After days of heating, water was applied to the heated rock, making it crack, and comparatively easy to carve with the special tools of those days, particularly the hammer and shafted chisel, still commemorated in the international emblem of mining, the "Schlägel und Eisen." A face would advance 4-5 ft per month with the burning method. No drilling was done in those days, although black powder was in use. This was applied to natural cracks and crevices in the walls of galleries and open stopes.

Ore and rock was hoisted to the surface with windlasses, man- or horse-drawn. Here the rich ore was treated by hammering and hand picking, whereas low grade was crushed in stamping mills, and concentrated in primitive jigs. Concentrates were smelted with pyrite in blast furnaces, the matte being re-treated in reverberatory furnaces to recover silver. Methods were crude and inefficient, costly, and encumbered with great losses of silver.

As hoisting and pumping were limited by the applied means of motivation, the sinking of shafts was also limited in depth, limits being approximately 100-150 ft by manpower, 250-300 ft by horsepower, and 500-600 ft when powered by water wheels. The latter were not always near the mine head or other points of power consumption, and therefore an ingenious system of power transmission was applied, transmitting the motivating power over hills and valleys for hun-

dreds of yards. See accompanying photograph of an old drawing in the archives of the Kongsberg Sölvverk.

At first hoisting and drainage problems did not exist. But Schlanbusch was foresighted enough to anticipate the need for water power the year round as the mines grew in depth. Accordingly he developed an elaborate system of 20 dammed lakes with connecting canals with storage capacity of nearly 2-million tons of water.

Schlanbusch also recognized that shafts would ultimately have to be sunk below the early 500 to 600 ft depths. He proposed to accomplish this by placing another water wheel at the bottom of the shaft to gain the additional 500 to 600-ft head, and drain the water from that level through tunnels. But his plans for drainage tunnels were put on ice by the Copenhagen administrator.

Resumption of development in 1815, and later of production in 1830, brought little technical change to mining. Mines in operation were reduced from 80 to a small number of principal workings. This simplified technical layout, which, together with the unusually rich occurrences of ore found in this period, boosted profits tremendously.

## Handboring Introduced Early

Handboring was introduced in the mines at Kongsberg during the 18th century. It began with bars of iron, tipped with steel of a peculiar, 5-pointed shape. Later these were replaced by bars with chisel-pointed bits of inlaid steel, and finally all-steel units were introduced. But most of the tunnels were mined by the burning method until the end of the 19th Century, borehole blasting being chiefly an auxiliary to the crack- and crevice-blasting of stopes and open pits. Tunnels were drainage tunnels exclusively while the ore was hoisted up the shafts to various mills at mine heads. Concentrates were transported by horse-drawn carts to the refinery in Kongsberg.

However, the urgent necessity at the end of the 19th Century to fight operating losses brought vast improvements to Kongsberg Sölvverk.

Drilling with compressed air replaced hand boring, and dynamite replaced black powder for blasting. Ore production per man soared. Furthermore, electricity was introduced as power for hoisting, pumping, and for various other purposes. This led to construction of a 300-hp electrical power plant, 1000 ft below the surface, powered by water from Schlanbusch's century old system of lakes and canals. Transportation was modernized, and shaft hoisting and subsequent wagon transport from the mills to the refinery in Kongsberg were replaced by horizontal transport along the former drainage tunnels. Gasoline locomotives took over, and hauled train-loads of ore along the main tunnel level to the new central mill and refinery at the tunnel opening in Saggrenda, nearly 4 mi outside the center of Kongsberg.

## Feed-Leg Drills Now Used

Today, most of the ore is mined by overhand shrinkage stoping. Drilling is done with jackhammers on feed-leg mountings. Detachable bits with tungsten-carbide inserts are manufactured in the mine's own workshop. Ore is drawn from the stopes through "chinaman chutes." Tramming is done with small, hand-pushed cars, and the ore is hoisted from the lower levels, or dropped from the higher levels, to bins on the main tunnel level. Highest workings are more than 500 ft above the main level, lowest are 500 ft below. The main level transport is by diesel locomotives, hauling trains of 10-12 cars, of 1.5-ton capacity. Average length of haulage is 3 mi. Annual ore production averages 14,000 tons. Development to secure this production totals approximately 2000 ft of drifts and crosscuts, and 1000 ft of raises and winzes per year.

From the mine, the cars are hauled to the top of the mill, where the ore is dumped over a grizzly into a bin. Oversize is hand-sorted. On the average, 10-12% of the rock goes to waste dumps. The rest of the oversize is broken with sledges, and goes into the undersize bin.

After stage crushing and screening, the ore goes to the jigs, where a concentrate of 40-60% Ag is taken off. The refuse goes to ball mills, and is from there distributed to a two-stage washing table, from which a 10-20% Ag concentrate is obtained. This concentrate is then treated further, chiefly by crushing in rolls and subsequent screening. Two products are obtained by this, one of 50-60% Ag, and one of 4-5%.

Tailings from tables are treated with CaCN. When all silver is dissolved, $Na_2S$ is added to the solution, and the precipitated $Ag_2S$ is taken off in filter presses. The remaining fluid goes to waste, as does the residue from the initial treatment with cyanide. Sand and slimes are treated separately, the former in large concrete tanks, where the solution is circulated by pumps, the latter in Pachuca tanks, where circulation is achieved by blowing compressed air in at the bottom of the tanks.

In the refinery, the three silver concentrates are treated individually. The 4-5% Ag concentrate is first roasted to burn off the sulphur of the pyritic minerals. Then it is smelted together with lead in a shaft furnace, giving a silver-lead alloy of some 40% Ag. After a second smelting of this product in a reverberatory furnace, a raw silver of 95-98% Ag is obtained. Slags from the shaft furnace are granulated with water and sluiced to waste. Lead oxides from the reverberatory furnace are re-used in the following shaft furnace smelting, with metallic lead.

The 40-60% Ag concentrates are smelted in a small blast furnace, giving a raw silver of 95-98% Ag. Slags from these smelting go together with the low grade concentrates on the subsequent shaft furnace smelting.

Finally, silver sulphide from the chemical extraction is roasted, yielding a raw silver as above.

Raw silver from these three processes is combined, after which another smelting in the reverberatory furnace brings the silver up to a purity of 998-999 fine. It will, however, still contain a small amount of occluded oxygen, making the silver brittle for rolling. This is removed by a final smelting, this time in crucibles, and under a cover of charcoal, whereafter the silver is either molded into ingots, or granulated.

## Yearly Silver Output, 4 Tons

Yearly production of fine silver at Kongsberg is about 4 tons, all of which goes for Norwegian consumption. Most of it is sold as fine silver. A minor part of it is made into silver nitrate.

Production of silver, together with the corresponding number of men at any time is given in the diagram, Fig. 2. A summary of the total production of silver in the various periods from 1623 and up to the present is given in the table, Fig. 3.

Profits and losses through all years are shown in the diagram, Fig. 4. Up to 1700, the obtainable figures have been uncertain, and often contradictory. However, it is believed that there was a total profit of nearly 2-million kroner, which in those days was a considerable amount of money. (1 kroner at par value = 25 cents). From 1700 to 1770 it went up and down. Nevertheless, the net profit of this period was in the neighborhood of 4-million kroner.

Resumption of the mining in 1815 and development up to 1830 cost the Norwegian State nearly 2-million kroner. The following profitable period lasted until 1888. Total net profits

*(Continued on p 112)*

**Fleet of 18 Mack diesel-powered trucks** with St. Paul 7-yd dump bodies which haul brown iron ore from deposits in eastern Texas to the Sheffield Steel's new iron ore beneficiation plant constructed recently at Rusk, Texas.

# How Sheffield's Beneficiation Plant Upgrades Texas Iron Ores

C. LEONARD LLOYD, JR.

Superintendent of Mines
Sheffield Steel

SHEFFIELD STEEL's newly constructed iron ore beneficiation plant at Rusk, Texas, was designed to treat brown iron ore from deposits in Cass, Cherokee, Marion and Morris counties of eastern Texas.

These ores occur near the tops of flat-topped, sand-covered hills. Geologic theory regards these deposits as having been formed during the Eocene epoch when the area was inundated. Ferruginous material known as the Weches greensand was deposited on top of the Green City sand. The Weches sand is covered by a residual blanket of Sparta sand.

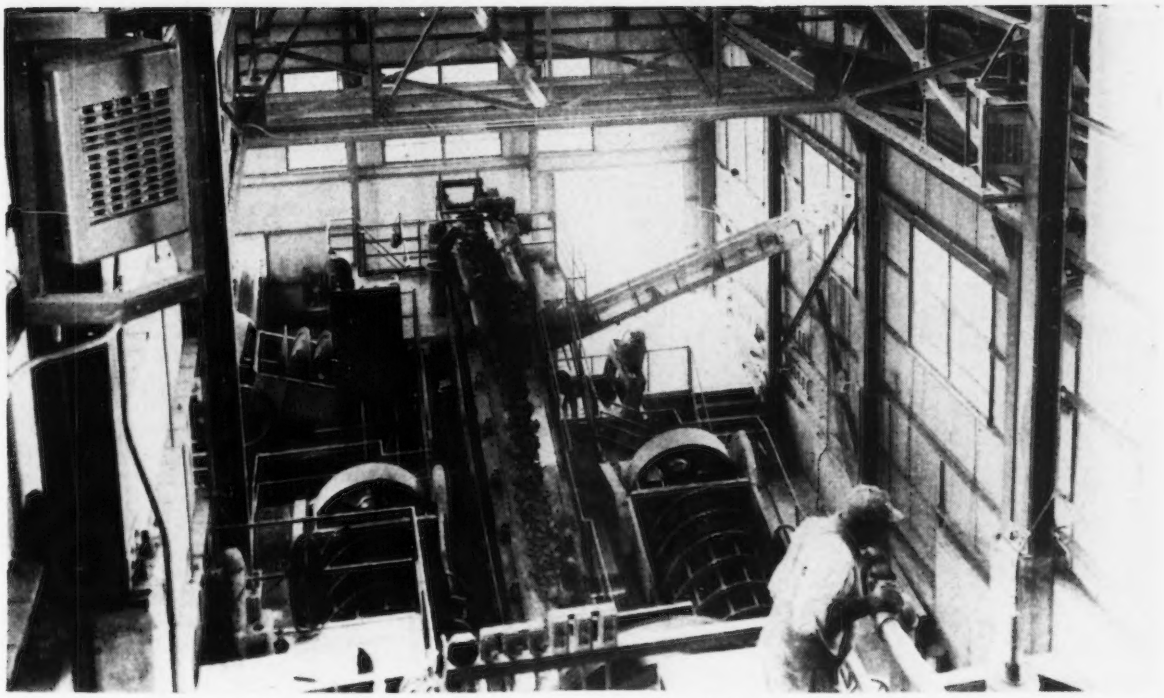
**Neat Design** is a feature of the new beneficiation plant, inside and out. Ore enters the plant at top, tailings are discharged at the left side into bins.

## How the Ore Was Formed

The Weches formation consists of glauconite and glauconitic sandy clay, with iron content varying from a small amount to 25%. Weathering and oxidation has produced limonite. Surface water seeping through the Sparta sand saturated the upper layers of the Weches, dissolved iron from the glauconite, and deposited it at the top of the Weches, where solution rose by capillary action. Thus the deposits were formed by lateral secretion and capillary rise, rather than by downward enrichment. Capillary migration from the Weches into the Sparta has resulted in enrichment and cementation by limonite, with the formation of a few inches of hard ferruginous sandstone, locally called the "sand cap."

## The Ore Deposits

This cap contains about 25% iron, but too much silica to rate as ore. A hard laminated ore containing about 48% iron usually underlies the sand cap, and adheres firmly to it. Chocolate-brown ore occurs beneath the laminated ore. In place, this material is of medium strength, but breaks into small pieces after prolonged exposure



**Three Akins classifiers** concentrate, wash, and dewater the ore in the beneficiation process. Hand sorting belt in center eliminates clay and sand rock. Plus 2-in. material from the picking belt goes through a Pioneer roll crusher.

to air. This buff crumbly ore is a true limonite commonly mixed or streaked with clay. Average iron content is about 45%. Brown to white clay underlies the buff ore beds. In some places the clay contains 17 to 35% iron.

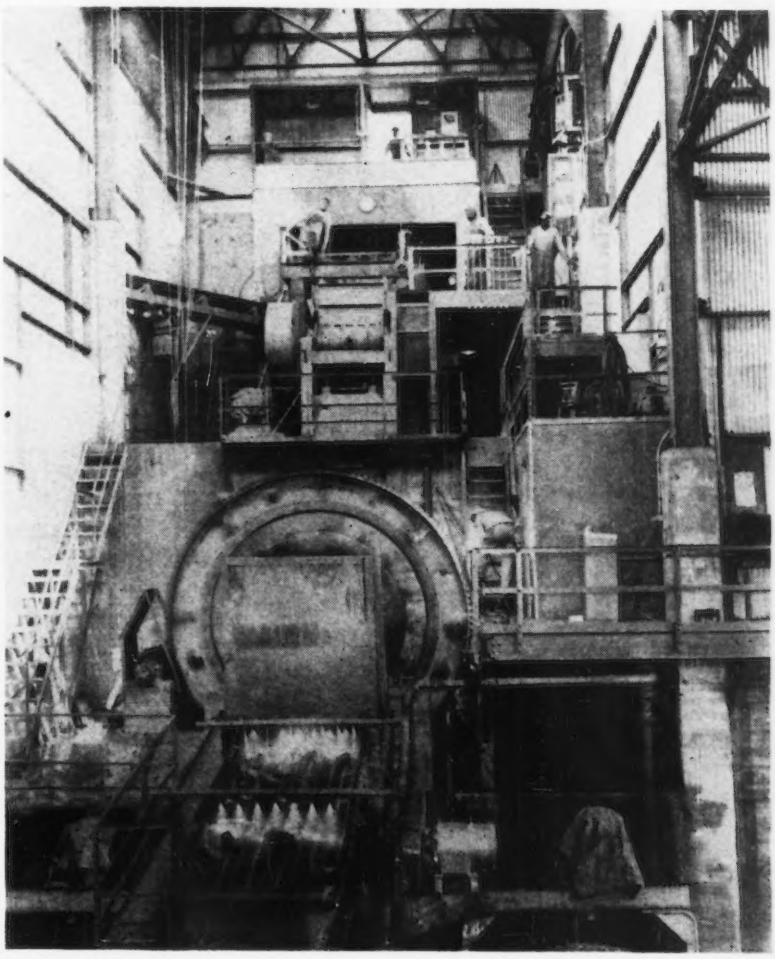
Overburden is composed of unconsolidated sand, clay, and the ferruginous sand cap. Thickness varies from a few feet to 40 ft. In general the ore is thickest at the outcrop, and thins out or disappears as it extends back in the hill or under deep overburden. The ore is relatively flat and smooth on top, but very irregular in its contact with the underlying clay.

Ore is mined by conventional stripping and open-pit methods, and the ore is hauled to the beneficiation plant by a fleet of 7-yd Mack diesel-powered trucks.

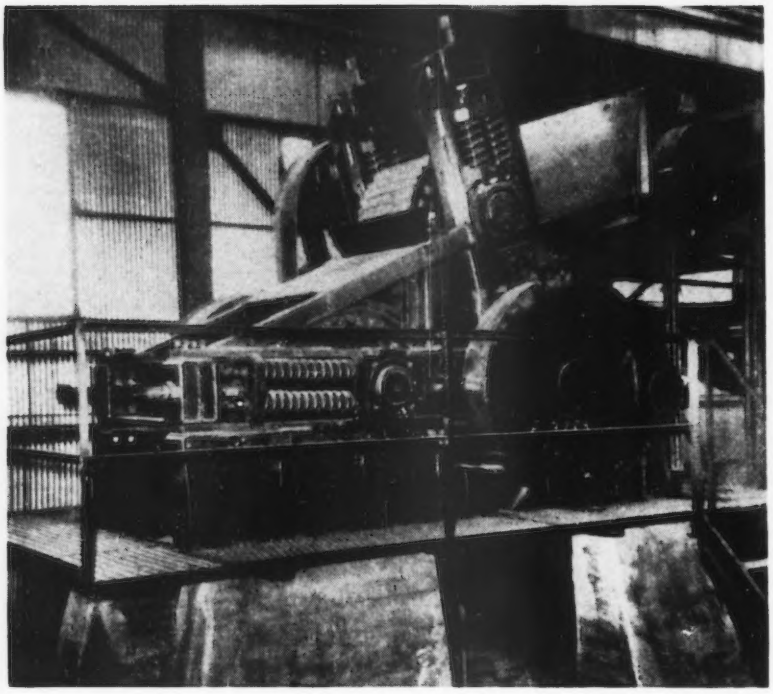
## The Beneficiation Plant

The new beneficiation plant was designed to obtain the best washed ore that is economically feasible. The crumbly nature of the ore rules out the violent treatment of the ore which would create excessive fines.

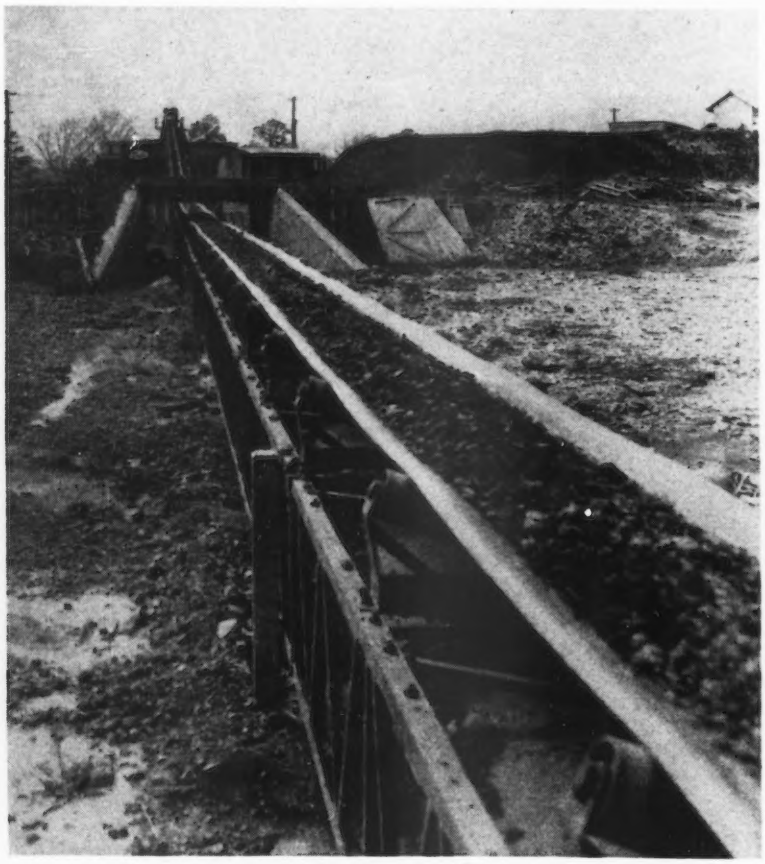
The flowsheet of the plant is briefly



**Flowsheet starts with** Pioneer jaw crusher (top) and vibrating screen, Allis Chalmers blade mill, and second Pioneer vibrating screen with sprays in foreground.



**Pioneer 40x22-in. triple-roll crusher** reduces feed from picking belt to minus 2-in. size and discharges it into 78-in. Akins screw-type classifier.



**Concentrates averaging** 44.74% iron are carried out of the plant on this 24-in. conveyor belt to the railroad loading bin shown in the background.

as follows: Crude ore is dumped into a hopper, from which it is fed by a 42-in. Oro manganese feeder to a 4x12-ft Pioneer Mesabi vibrating screen with 5-in. openings. Water is introduced on this screen. Minus 5-in. material by-passes a 30x42-in. Pioneer jaw crusher. Plus 5-in. material goes through a jaw crusher which reduces the ore to minus 5-in.

All of the material then enters a 8x16-ft Allis-Chalmers blade mill which consists of a revolving drum with an interior that is checker-boarded with projecting blades set at an angle to move the material through the mill as it is agitated. The tumbling and washing action of the blade mill breaks up the clay and dirt and puts it into suspension. Discharge of the blade mill goes over a 4x12-ft Pioneer vibrating screen with 2-in. openings. Minus 2-in. material passing through the screen is split and fed to two 78-in. Akins screw-type classifiers. Here the material gets a secondary washing and dewatering. Plus 2-in. material passes over the screen under spray bars, and discharges onto a 42-in. picking belt where clay balls and ferruginous sand rock are removed.

The hand-picked plus 2-in. material then passes into a Pioneer triple-roll crusher which reduces it to minus 2-in. This material in turn passes from the roll crusher into a third 78-in. Akins classifier for another washing and dewatering. The final product from all three classifiers is discharged onto a 24-in. conveyor which carries the ore to a storage bin over a track and scale for ultimate shipment to Houston.

## Capacity is 300 Tons per Hr

The following average analysis indicates the grade of product being produced by the plant:

| | |
|---|---|
| Fe | 44.74% |
| $SiO_2$ | 13.54% |
| $Al_2O_3$ | 7.91% |
| P | .315% |
| Moisture | 5.7% |

Screen analysis of the product is as follows:

| | |
|---|---|
| +4-in. | 0% |
| +3-in. | 1.3% |
| +2-in. | 6.2% |
| +1½-in. | 5.2% |
| +1¼-in. | 2.6% |
| +1-in. | 6.0% |
| +½-in. | 9.8% |
| +¼-in. | 19.1% |
| +⅛-in. | 12.9% |
| −⅛-in. | 36.9% |

The plant which was designed by the author and constructed under his supervision is capable of producing more than 300 tons of concentrates per hour.

# OPERATING IDEAS

**AL HRBACEK, JR,** manager of Moab Drilling, shows progress in swivel design. Unit at left is latest design.

**JUNK TRAP** inserted in tool string above drill bit catches broken pieces of drill bit washed up from bottom of hole.

**TWO-WAY RADIO** saves time, speeds operation. All company drill rigs are radio-equipped.

## New Drilling Ideas at Moab

AMONG THE UNIQUE OPERATING IDEAS used on the rotary Mayhew drills now at work in the Big Indian Wash uranium field were the following, pointed out to *E&MJ* editors by Charles Steen, president, and Albert Hrbacek, Jr., manager of Moab Drilling Co.:

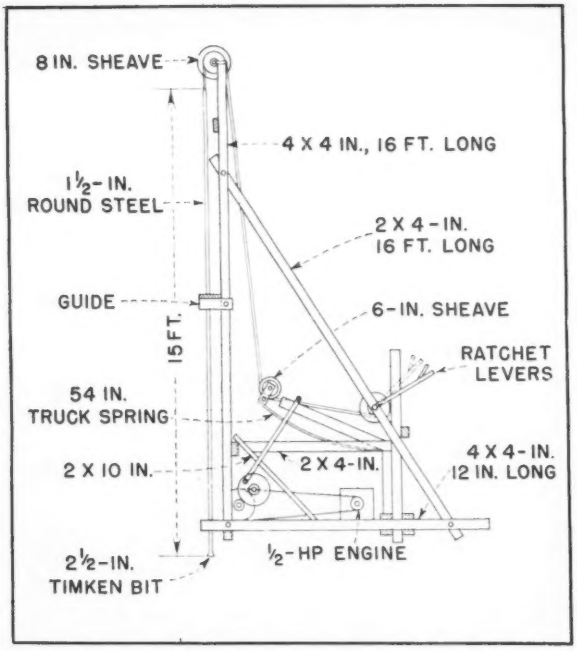
**Swivel.** If this device, which suspends the drill rods breaks, it is easy to ruin a string of tools. Accordingly the simple swivel bale shown above was strengthened as shown in the center, and finally replaced by a hinged elevating collar (left) which is now used to raise the tool string.

**Junk trap.** Occasional pieces of hard steel that work off of a rotary bit will damage the bit as drilling proceeds. Moab Drilling Co. uses the junk trap shown above which is inserted in the tool string above the bit. When the hole is flushed, the steel pieces are washed upward and then drop into the trap.

**Radio.** Exploratory drills are usually operated miles from nowhere, and telephone lines are never handy. Moab Drilling Co. installs a radio on each of its rigs. This enables the operator to order parts, receive instructions, or report progress or breakdowns.

**Vacuum Pump.** Drill water is obtained from a creek and transported in a tank truck to the Moab Drilling rigs. Most drillers have a small gasoline pump on the tank truck to fill the tank. But Moab Drilling Co. trucks are fitted with a vacuum pump connected to the manifold of the truck engine. The engine-created vacuum is sufficient to fill the 1000-gal tank in 15 to 20 min.

**MAYHEW ROTARY DRILL** of Moab Drilling Co. putting down exploration hole in Big Indian Wash area. Truck at left carries 1000-gal water tank.

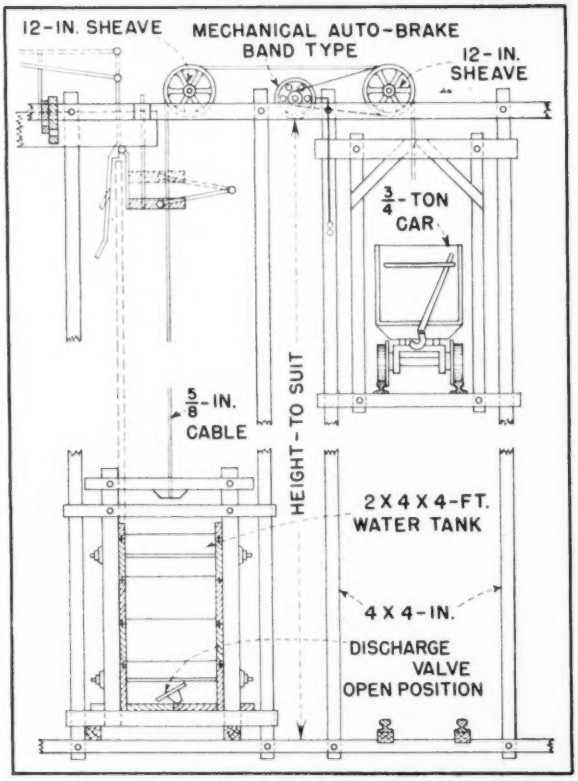



## Small Churn Drill Outfit

WM. H. GAINES of Wenatchee, Wash., submits this design for a small churn drill which was used to explore several deposits in Chelan County, Wash. It is capable of drilling homogenous structures to a depth of about 75 ft, depending on rock formations, and conditions.

Note in particular the 54-in. single leaf truck spring which produces quite a rebound when the steel drops, and keeps the cutting face of the bit free from impacted sediment. The drill is operated at 60 drops per min, and through a height of 10 to 16 in. The rig is so constructed that it is portable for short moves, or dismantled for long moves. On some hard holes, the Timken bit attached to the steel had a tendency to disengage while in the hole. This was remedied by tack-welding the bit to the steel. The tack-welds could be sawed through with a hack saw for bit change. Power for the churn drill is supplied by a ½-hp gasoline engine.

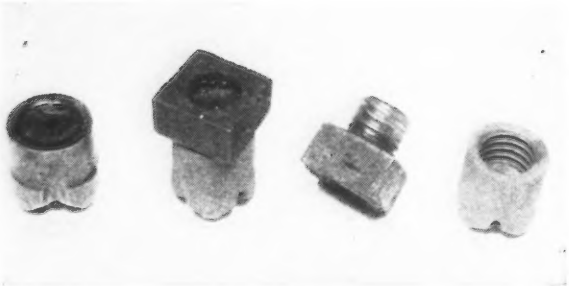
The side view of the drill shown above reveals other operating principles including the pitman action and method of feeding and reeling cable.




## Water-Driven Hoist

HERE'S ANOTHER IDEA for the small mine operator or prospector submitted by Wm. H. Gaines, Wenatchee, Wash.: —a water-driven hoist used at the Yellow Jacket, Idaho to hoist old tailings 28 ft to the top of cyanide treatment tanks. Water for the operation was obtained from a ditch above the top of the structure. Referring to the sketch, the water tank is shown in the lower position. After the car is dumped and returned, its weight and that of the cage is greater than that of the empty water tank and its cage. Thus the car and the cage can be lowered by gravity by releasing the brake. When the tank starts to rise, the flap valve at bottom closes. Contact between the tank and the lever at the top of the unit opens a water valve on the flume, thereby refilling the tank. Thus the water-filled tank is ready to hoist another load.

# Bit Recovery Idea Saves Mining Company $17,000 Yearly

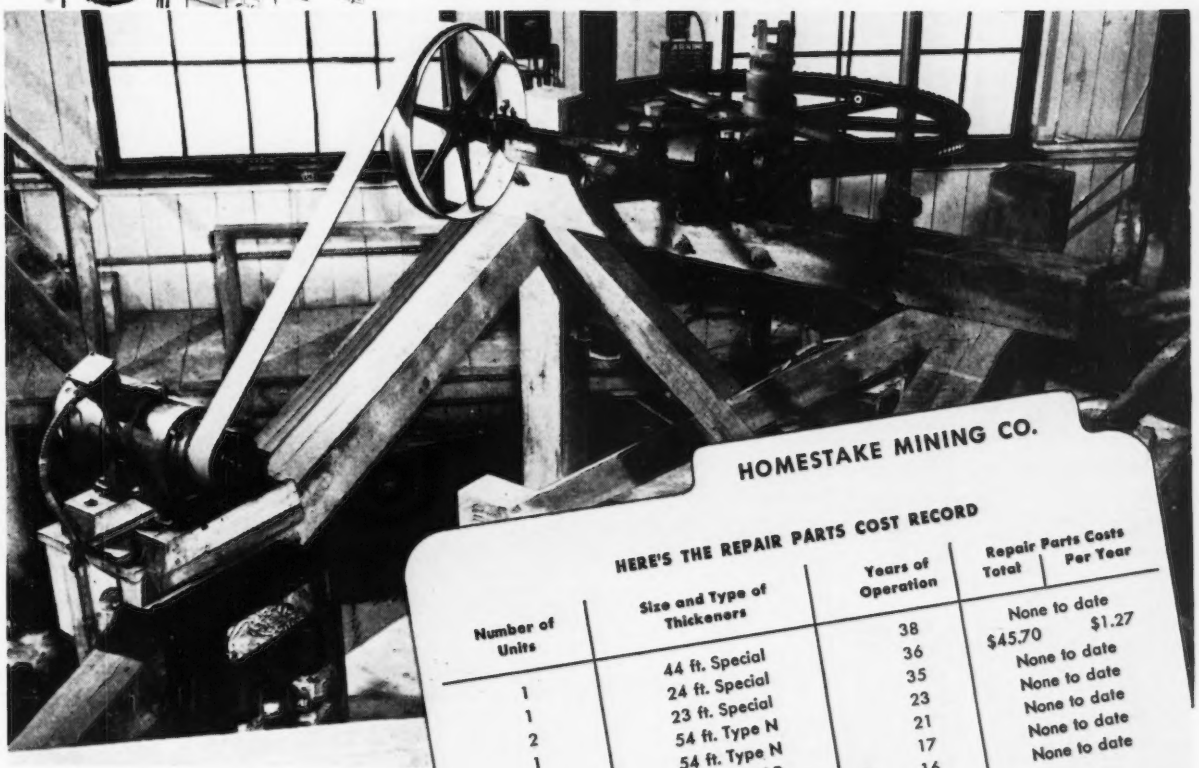


THIS IDEA OF EXTRACTING broken drill-rod fragments from the sockets of detachable tungsten-carbide bits netted a cash award of $1,000 to Angus M. Livingstone, employee of the Sullivan mine of Consolidated Mining and Smelting Co. of Canada, Ltd., for having suggested the idea. It is estimated that the idea will save the company about $17,000 a year—all of which proves that it pays to reward your employees for good ideas.

The illustration (left) tells the story. A nut is placed over the base of the bit containing the threaded end of the steel rod. The nut is arc-welded to the drill-rod fragment without touching the bit. If the fragment is lodged deep in the bit thread, a small pipe is inserted to protect the bit thread, and the weld is carried from the fragment up through the pipe, to the nut. The nut with attached steel fragment can then be removed with a large pipe wrench. The square hole in the left-hand illustration is caused by trial with an easy-out. If this method of extraction fails, the nut-welding technique is used.

# AT HOMESTAKE MINING COMPANY

## *Eight Dorr Thickeners in slimes circuit average 21 cents per unit per year for repair parts cost.*



**HOMESTAKE MINING CO.**

**HERE'S THE REPAIR PARTS COST RECORD**

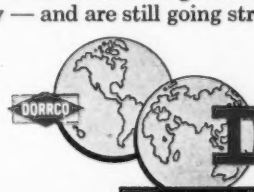
| Number of Units | Size and Type of Thickeners | Years of Operation | Repair Parts Costs Total | Repair Parts Costs Per Year |
|---|---|---|---|---|
| 1 | 44 ft. Special | 38 | None to date | |
| 1 | 24 ft. Special | 36 | $45.70 | $1.27 |
| 1 | 23 ft. Special | 35 | None to date | |
| 2 | 54 ft. Type N | 23 | None to date | |
| 1 | 54 ft. Type N | 21 | None to date | |
| 1 | 54 ft. Type R | 17 | None to date | |
| 1 | 60 ft. Type R | 16 | | |
| 1 | | | | |

Closeup of drive mechanism of one of the eight Dorr Thickeners in the Homestake slimes circuit. This particular 24' diameter unit has been operating since 1914.

In the period 1911 to 1933, Homestake ordered eight Dorr unit-compartment Thickeners of varying types and sizes for slimes thickening. As shown in the table above, the maintenance record of these units is adequate testimony that they were built to last.

Light duty in the slimes circuit — sure. We'll also have to admit to remarkably careful and efficient operation on the part of Homestake over the years. But bear in mind that these are light machines — built for light duty — and are still going strong after 16 to 38 years of continuous operation.

We wouldn't suggest that you can expect "no repair" performance on every Dorr Thickener regardless of type of duty. Point is, though, when you buy Dorr you buy minimum repairs. More important still, you buy minimum shut-down time and maximum production. The Dorr Company, Stamford, Conn., or *in Canada*, The Dorr Company, 26 St. Clair Avenue East, Toronto 5.




Better tools TODAY to meet tomorrow's demand

**DORR**

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world.

## Copper Statistics — January-September 1954

Following is a summary of the Jan.-Sept. copper statistics of Copper Institute, figures in short tons:

UNITED STATES

| | Crude Production—Primary | Crude Production—Secondary | Refined Production | Deliveries to Fabricators | Stocks Refined at End |
|---|---|---|---|---|---|
| January | 76,912 | 7,304 | 111,553 | 77,091 | 108,121 |
| February | 68,034 | 6,394 | 103,496 | 89,017 | 118,417 |
| March | 73,429 | 7,671 | 117,546 | 95,795 | 125,759 |
| April | 70,977 | 6,486 | 112,617 | 104,579 | 124,523 |
| May | 71,571 | 6,660 | 108,403 | 111,005 | 82,111 |
| June | 74,113 | 11,216 | 112,121 | 106,252 | 69,181 |
| July | 66,070 | 9,597 | 107,095 | 97,436 | 68,921 |
| August (a) | 52,825 | 8,784 | 103,901 | 92,475 | 58,387 |
| September | 61,612 | 7,015 | 87,623 | 88,947 | 47,666 |

OUTSIDE UNITED STATES

| | Crude Production—Primary | Crude Production—Secondary | Refined Production | Deliveries to Fabricators | Stocks Refined at End |
|---|---|---|---|---|---|
| January | 114,652 | 531 | 85,100 | 91,941 | 280,510 |
| February | 109,041 | 702 | 70,864 | 74,457 | 275,375 |
| March | 123,441 | 583 | 93,824 | 93,235 | 279,804 |
| April | 124,846 | 176 | 87,747 | 99,193 | 273,070 |
| May | 118,099 | 262 | 95,564 | 115,197 | 255,234 |
| June | 124,503 | 266 | 88,615 | 130,323 | 180,651 |
| July | 130,518 | 358 | 105,827 | 105,281 | 170,558 |
| August (a) | 122,656 | 801 | 100,437 | 103,405 | 172,326 |
| September | 125,082 | 506 | 107,489 | 110,234 | 172,048 |

Note: The statistics do not balance largely because of deliveries to the U. S. stockpile. Production of Cuba and the Philippines included under U. S. (a) Corrected.

## Copper Consumption

The copper content of shipments to customers of U. S. fabricating plants during 1952, 1953, and 1954, by months. in tons:

| | 1952 | 1953 | 1954 |
|---|---|---|---|
| January | 131,988 | 134,203 | 100,805 |
| February | 115,150 | 123,850 | 94,975 |
| March | 116,981 | 122,980 | 103,796 |
| April | 106,397 | 116,419 | 104,693 |
| May | 110,388 | 126,972 | 102,810 |
| June | 107,709 | 132,395 | 104,651 |
| July | 82,630 | 91,826 | 80,751 |
| August | 120,084 | 113,259 | 102,966 |
| September | 123,740 | 111,805 | 106,454 |
| October | 127,120 | 116,250 | ..... |
| November | 130,027 | 102,258 | ..... |
| December | 119,263 | 83,652 | ..... |
| Total | 1,371,477 | 1,375,869 | ..... |

Stocks of refined copper in the hands of fabricators on Sept. 30 totaled 341,649 tons, which compares with 359,474 tons a month previous.

## Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipments f.o.b. New York unless otherwise stated, tons of 2,000 lb. unless otherwise noted.

### MISCELLANEOUS METALS

October 30, 1954

| | |
|---|---|
| Aluminum ingot, 99 plus percent, lb. | 22.2¢ |
| Antimony, spot, lb., less than carload, in cases | 31.97¢ |
| In bulk, carload lots, f.o.b. Laredo | 28.50¢ |
| Bismuth, ton lots, lbs. | $2.25 |
| Cadmium, commercial sticks, delivered, lb. | $1.70 |
| Calcium, lb., ton lots, 98 percent, cast | $2.05 |
| Chromium, 97 percent grade, lb., contract | $1.18 |
| Cobalt, 97 to 99 percent, per lb. | $2.60 |
| Germanium, lb. | $295.00 |
| Indium, troy oz. | $2.25 |
| Lithium, lb., 98 percent | $11.00 @ $14.00 |
| Nickel, cathodes, lb., f.o.b. Port Colborne (a) | 60¢ |
| Magnesium, 99 8 percent, carloads, lb., producer's plant, Freeport, Texas | 27¢ |
| Palladium, troy oz | $17 @ $21 |
| Platinum (wholesale lots) troy oz. | $79.00 @ $84.00 |
| Quicksilver, flask of 76 lbs., 25 flasks or more | $325 @ $330 |
| Selenium, 99 plus percent, lb. | (b)$5.00 @ $6.00 |
| Silicon, minimum 97 percent, carloads, lb. | 18¢ |
| Tellurium, lb. | $1.75 |
| Thallium, 100 lb. or more, lb. | $12.50 |
| Titanium, 99.3 plus, grade A, lb. | $4.72 |

(a) Includes U. S. duty. (b) Depending on quantity.

### METALLIC ORES

| | |
|---|---|
| Beryllium Ore, imported, 10% BeO, per short ton unit | $39.00 |
| Chrome Ore per long ton. f.o.b. cars Atl. ports, dry: | |
| 44% $Cr_2O_3$ no ratio | $21.00 @ $22.00 |
| 48% $Cr_2O_3$ 3 to 1 ratio | $43.00 @ $46.00 |
| Iron Ore, Lake Superior, Lower Lake ports, long ton: | |
| Old Range bessemer | $10.30 |
| Mesabi bessemer | $10.05 |
| Mesabi, non-bessemer | $9.90 |
| Lead (Galena), 80 percent, Joplin, Mo., ton | $187.85 |
| Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties 70 @ 75¢ c.i.f. U. S. ports, duty extra. Long-term contract nominal at 65 @ 70¢ c.i.f. duty extra. | |
| Molybdenum Ore, 90%, per lb. of $MoS_2$ f.o.b. mines | 60¢ |
| Columbium-Tantalum, per lb., combined oxides | $3.40 |
| Tungsten Ore, per unit of $WO_3$: | |
| Foreign 60 percent, c.i.f. U. S. ports, duty extra | $24.75 @ $25.25 |
| Domestic, scheelite, 60 percent f.o.b. mill | $63.00 |
| Vanadium Ore, per lb. of contained $V_2O_5$ f.o.b. mines | 31¢ |
| Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton | $68.00 |

### METALLIC COMPOUNDS

| | |
|---|---|
| Arsenous Oxide (arsenic trioxide) lb., in bbl. carload lots delivered | 5½¢ |
| Cobalt Oxide, 72½% to 73½%, ceramic grade, per lb. | $1.96 @ $1.97½ |
| Copper Sulphate, 100 lb. | $10.35 |
| Germanium Oxide, lb. | $142.00 |

### ALLOYS

| | |
|---|---|
| Ferrochrome, 65 to 69 percent, per lb. of Cr contained | 24¾¢ |
| Ferromanganese, 74–76%, net ton, seaboard | $190 |
| Ferromolybdenum, 55 to 65 percent Mo. lb. of Mo. contained | $1.32 |
| Ferrosilicon, 50 percent per lb. of contained Si | 12¢ |
| Ferrotungsten, 75 to 80 percent, lb. of W contained | $3.80 |
| Ferrovanadium, per lb. of V delivered | $3.00 @ $3.25 |
| Silicomanganese, Max. 1½ percent carbon, lb. per contracts | 11.4¢ |
| Spiegeleisen, per long ton, 19 @ 21% grade | $86.00 |

### NON-METALLIC MINERALS

| | |
|---|---|
| Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds) ton: | |
| Crude No. 1 | $960 @ $1,500 |
| Crude No. 2 | $595 @ $900 |
| Spinning fibers | $321 @ $514 |
| Shingle fibers | $150 @ $200 |
| Paper stock | $109 @ $137 |
| Waste | $77 |
| Shorts | $35 @ $70 |
| Asbestos, f.o.b. Vancouver, B. C. (U. S. funds): | |
| Spinning fiber, 3-K | $460 |
| Shingle fiber, 4-K | $185 |
| Asbestos, Vermont, f.o.b. Hyde Park: | |
| Spinning fibers | $279.50 @ $302.00 |
| Shingle stock | $135.00 @ $162.00 |
| Paper stock | $81.50 @ $115.00 |
| Waste, stucco or plaster | $71.40 |
| Refuse or Shorts | $34.00 @ $63.00 |
| Barytes f.o.b. cars: | |
| Georgia, crude, per ton | $15.00 |
| Missouri, 94 percent $BaSO_4$, per short ton | $13.25 |
| Bauxite, long ton, f.o.b. point of shipment: | |
| Domestic crude, 50 to 52 percent (not dried) | (a) $5.00 @ $5.50 |
| Domestic, chemical, 55 to 58 percent | (a) $8.50 @ $9.05 |
| Domestic, abrasive, 80 to 84 percent | (a)$18.00 @ $18.50 |
| Feldspar, bulk ton. | |
| Potash or soda feldspar, 200 mesh, ceramic grade | $18.50 @ $22.25 |
| Glass feldspar, white, 20 mesh | $11.75 @ $12.50 |
| Fluorspar, f.o.b mines, bulk, 70% effective, ton | $32.00 @ $33.00 |
| 60% effective $CaF_2$ | $28.00 @ $29.00 |
| Acid 97% concentrate, bulk, ton | $47.50 |
| Fuller's earth, f.o.b. Georgia or Florida, ton | $7.00 @ $14.00 |
| Magnesite, per ton dead-burned, bulk, f.o.b. Washington | $38.00 |
| Mica—Domestic, f.o.b. mines, Punch 12 to 22¢. per lb. according to size and quality. Sheet clear, 1½ x 2 inch, 70¢. to 85¢.; 2 x 2 inch, $1.10 to $160; 2 x 3 inch, $1.50 @ $1.60; 3 x 3 inch, $1.80 @ $1.90; 3 x 4 inch, $2.20; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet, ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground: $32.50 @ $70.00 per ton. Scrap $25 and up. | |
| Ocher, Georgia, ton, in sacks | $26.50 @ $30.00 |
| Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports | Not quoted |
| Sulphur, Texas, mines, long ton | $25.50 @ $27.50 |
| Talc, f.o.b. works, ton | |
| New York, purified | $18.50 @ $20.00 |
| Vermont, extra white | $13.50 |
| Tripoli, Missouri, ton: | |
| 40 mesh, cream colored | $30.00 |

(a) Normal. (b) Effective Oct. 1.

### IRON AND STEEL

| | |
|---|---|
| Pig Iron, gross ton, basic, Valley Furnaces | $56.00 |
| Steel f.o.b Pittsburgh, billets, net ton | $64.00 |
| Structural shapes, 100 lb. | $4.25 |

● Noon or midnight the loading area of this Ryerson plant looks much the same because we work 'round the clock to make sure that you get Ryerson Steel when you need it. Carbon steel, alloy steel, stainless—every kind is on hand, in practically every shape and size. Your requirements can be set down where you want them, quickly, cut to size and ready for immediate use. Just call the nearest Ryerson plant.

PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C.
CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO
MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

# RYERSON

# Next Steps in Atomic Progress... A Challenge to American Industry

The purpose of this editorial is to throw light on the significance for American industry of recent changes in the statutes that control the development of atomic energy.

The need for clear light on the meaning of this new legislation is made more urgent by the political confusion and distortion that marked its course through Congress. The politically inspired charges of "giveaway" that delayed its passage—charges that were almost totally unrelated to the legislation itself—helped to obscure the vital importance of the step finally taken by Congress.

In sober, post-Congressional fact, the principal significance of the new atomic legislation is that it extends to private enterprise responsibility for the development of peaceful uses of atomic energy, whereas heretofore this responsibility has rested in a tight government monopoly. **And this extension is made on terms that emphasize the responsibility far more than they open any opportunity for economic gain in fulfilling it.** The revised Atomic Energy Act provides that:

1. Industry may now own and operate its own nuclear reactors, under license from the Atomic Energy Commission. And it may build and sell nuclear reactors for export.

2. Industry may use—but not own—nuclear materials at the discretion of the Atomic Energy Commission.

3. The Atomic Energy Commission will make available to industry scientific knowledge that may be useful in developing peaceful applications of nuclear energy.

4. For the first time, industry will have the right to patent inventions in the field of nonmilitary nuclear energy. However, "basic" discoveries must be made available to all companies in the field for a period of five years, after which they, too, will revert to normal patent status.

## Two Kinds of Know-How

These provisions, despite the imposed limitations, represent the first positive step toward development of nuclear energy for peaceful applications in the United States. Potentially useful knowledge, previously locked in the minds of government scientists, will now be available to all those who are willing and able to put it to work for the good of mankind.

The advantages to be gained from enlisting the talents of American industry in the development of peaceful atomic applications are imposing. As *The* (London) *Economist*, Europe's leading economic journal, recently remarked, "The atomic scientists are in a position to surmise how atomic energy can be applied... but they lack the specialized knowledge of engineering design and operating technique just as industry itself lacks atomic knowledge." Now the engineers of private industry need no longer lack the atomic knowledge, and there is granted to them at least a restricted freedom to apply it to the solution of their engineering and operating problems.

**But the new opportunity for private industry to find constructive uses for the science of nucleonics carries with it a grave responsibility.** These uses must be so developed that they will benefit the people of all the free nations. It is essential that the United States, which pioneered in developing lethal uses for atomic fission, demonstrate to the world our paramount interest in its peaceful application. It would be a moral set-back to the free world almost beyond calculation if the Communists should be able to offer to the poorer nations of the world the benefit of low cost atomic power—provided by Communist technicians—while we concentrate primarily on building our stockpile of atomic and hydrogen bombs.

## Race For a Peaceful Victory

Most of the experts are agreed that it may be many years—perhaps ten, fifteen or more—before the cost of electricity from atomic fission can be reduced to a level that will make it competitive with conventionally produced power in most regions of the United States. But most of the world is not nearly so fortunate as we are in power resources. Electricity, even at a cost far higher than the average that prevails in the United States, would be a blessing in many countries, and the nation that provides the technology to bring it into being will score a great moral victory.

The useful potential of nuclear energy is not restricted to the generation of electric power—although twenty years from now this use will be highly important to the power industry of the United States. Even with the limited research that has been done in this field thus far, the use of radioisotopes—the radioactive products of atomic reactors—is saving American industry an estimated $100 million a year. Commissioner Campbell of the AEC, who made this estimate, believes that these savings may well reach $1 billion a year within ten years. Radioisotopes are already at work in industries ranging all the way from paper manufacturing, where they measure paper thickness, to pipeline transportation, where they mark the dividing lines between shipments of different products (at an estimated saving of $500,000 a year). Medical applications of these same radioisotopes hold promise of longer and more comfortable lives for those who are stricken by cancer and other diseases.

## Above All a Challenge

The new Atomic Energy Act is a crucial stride toward the day when all these benefits—and undoubtedly others not yet revealed by research—will be realized. But it is a step that is essentially permissive. It still leaves it to private industry for the most part to decide what is to be done and how soon.

**The new act is thus, above all, a challenge.** It confers on private industry the responsibility to assume a leading role in the development of peaceful uses for nuclear energy, a step long urged by NUCLEONICS, a McGraw-Hill magazine devoted to atomic energy. To achieve a success in this task that will measure up to the requirement of the national interest, this development must command all the resources and ingenuity that private enterprise can apply—and do so without promise of glittering prizes surely to be won. **But now that the responsibility has been defined and the challenge offered, American industry will, we believe, measure up to its grave and mighty import.**

*This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.*

*Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.*

Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

# WASHINGTON IMPACT

*Morton A. Reichek, McGraw-Hill Washington News Bureau*

## Mining Mobilization Authority Moves from ODM to Interior

REORGANIZATION OF THE GOVERNMENT'S mobilization setup for the mining industry is shaping up. It will involve the transfer from GSA to the Interior Dept. of defense planning authority in the field of metals and minerals.

Under the new arrangement, ODM will remain as the top policy agency for all industrial mobilization planning. But Interior will now have the same mobilization function for mining that ODM has already delegated to the Department for the electric power, oil, and coal industries, to Agriculture Dept. for food industries, to ICC for transportation industries, and to Commerce Dept. for manufacturing. This includes planning for industrial defense, emergency controls, supply and requirements, and related mobilization matters.

An Office of Minerals Mobilization will be created in Interior to handle the Department's new responsibility. It will operate under the wing of Felix Wormser, the assistant secretary for mineral resources, and will be temporarily headed by John Liebert, a Government lawyer who serves as Wormser's executive assistant. Later, a mining industry executive may take over the post.

The bureaucratic switch stems from recent discussions of the inter-agency President's Minerals Policy Committee. Idea is to give mining a better chance to participate in mobilization planning through Interior, which is the industry's traditional Government contact point. In addition, it's felt that technical resources of Interior's Bureau of Mines and Geological Survey can be more effectively used for defense planning under the new setup.

GSA will continue as the Government's metals and mineral procurement agency. But now Interior will have some voice in GSA's purchase programs. Interior will also have standby authority to allocate ores and concentrates and to grant priorities for procurement of mining equipment in case of war.

GSA inherited the defense planning authority for mining from the now-defunct Defense Materials Procurement Agency. It lacked the staff, however, to accomplish much in this field. Earlier, the authority had been transferred to DMPA from the ill-fated Defense Minerals Administration, which was set up in Interior when the Korean conflict started, then hastily abolished.

Meanwhile, ODM has a new assistant director for materials, who still holds top authority to determine defense requirements for metals and minerals, stockpile objectives and acquisitions, and related government policy. He's William S. Floyd, on leave as Shell Oil's purchasing manager. He succeeds Elmer Weaver, now back as Union Oil's purchasing manager. Both Floyd and Weaver are prominent California members of the influential National Association of Purchasing Agents.

### GSA Scandal and Crackdowns

Scandals in government stockpile buying—long rumored in Washington—may soon be officially aired. In recent weeks, GSA has sent several cases that "indicate fraud" to the Justice Dept. for further investigation and possible indictment.

The cases involve tungsten buying by the Emergency Procurement Service, a GSA Bureau—specifically, purchase of tungsten smuggled into the U.S. from Mexico and other foreign countries, then pawned off as domestic metal to EPS. According to widespread charges here, heavy tonnages of bootlegged tungsten—and maybe other metals—have been improperly sold to EPS.

At the same time, an "administrative" shakeup is brewing for EPS. But GSA officials deny this is tied to the possibly fraudulent tungsten deals. They say it stems from a comprehensive "management review" that's been made of all GSA bureaus.

In all, GSA has sent about 20 allegedly fraudulent stockpile-purchase cases to Justice after a preliminary investigation of its own. Six are at the stage where U.S. attorneys are deciding whether there's enough evidence to go to court.

The alleged tungsten scandals have attracted several other Government agencies to the scene. As one official puts it: "I've never seen so many agencies and Congressional Committees scrambling into one investigation." The General Accounting Office, which makes independent audits of federal expenditures for Congress, is making a full-scale investigation. Then the Internal Revenue Service is checking tax returns of individuals involved.

The tungsten investigations may have been prompted by some loud griping in Washington by a small California tungsten processor, who has complained to all who would listen here that his regular sources of concentrates, mainly in Mexico, have vanished because of the premium-price lure of GSA's domestic purchase program.

In addition to the tungsten deals, the Joint Congressional Committee on Defense Production is investigating "irregularities on the part of (mining) companies and Government personnel" on GSA defense loans and purchase commitments where firms have defaulted.

Four contracts are being checked: Westmoreland Manganese Co., which has borrowed $2-million; Appalachian Smelting & Refining Co., $675,000; Midcontinent Mining Co., $325,000; and MacArthur Mining Co., $45,000. The committee had planned to hold public hearings on the four deals. These were called off, however, when the chairman, Sen. Homer Capehart (R., Ind.), became busy with the much-publicized FHA Housing Scandals investigated by the Senate Banking Committee, of which he is also chairman.

During the summer, the Defense Production Committee held lengthy hearings on another "questionable" mining loan of $3-million to the U.S. Tin Corp. of Alaska. Several irregularities were revealed: the firm issued stock for services rendered, in violation of the Government contract; it hired a Government official involved in the loan's approval for high company post; the loan was okayed although the Government failed to check title to the property; and finally that the Government continued to advance funds after the firm had violated the contract several times.

The committee is drafting a report on the case to be turned over to Justice for action. The report will blame the "gross inefficiency" of Government officials who ran the defense lending program. "It is inconceivable," the report states, "that a government agency responsible for lending so much money could make so many mistakes."

These developments have prompted GSA to crack down on enforcement of its outstanding contracts. The agency is tightening up on specification acceptances and renewals and extensions where companies are in default.

### Magnesium Plant for Sale

The future of the world's largest magnesium plant—the Government's 36,000-ton facility at Velasco, Tex.—was tied up at press time in a knotty anti-trust issue.

Dow Chemical Co., which operates it for the Government on a lease that's about to expire, wants to buy the plant. GSA is willing to sell. But Justice Dept., which must pass on sales of government property worth more than $1-million, objects. Justice claims the proposed sale to Dow, the sole commercial magnesium producer, would "tend to maintain a situation inconsistent with the anti-trust laws."

Velasco's magnesium facilities are located in the midst of a 500-acre plant site purchased from the government by Dow in 1947. Dow produces a wide variety of chemicals on its own facilities there. Justice blocked Dow's acquisition of the magnesium facilities seven years ago, ruling that "in view of past anti-trust violations by Dow . . . to expand facilities to the extent represented by Velasco . . . would be regarded as illegally furthering a monopoly."

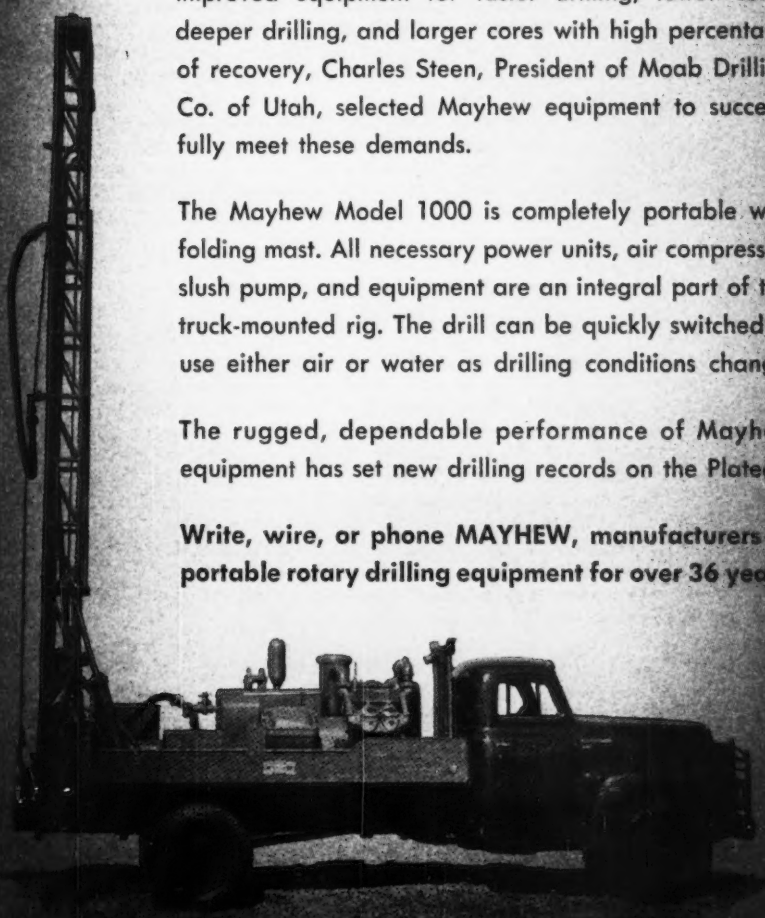
# MAYHEW ROTARIES LEAD THE FIELD IN URANIUM EXPLORATION

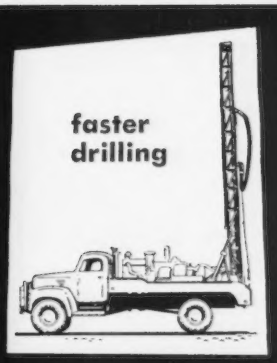
As increased exploration campaigns demanded improved equipment for faster drilling, lower costs, deeper drilling, and larger cores with high percentage of recovery, Charles Steen, President of Moab Drilling Co. of Utah, selected Mayhew equipment to successfully meet these demands.

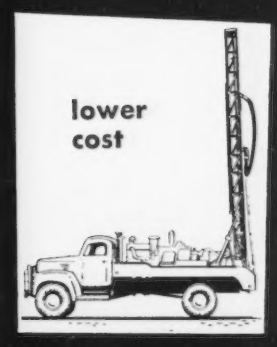
The Mayhew Model 1000 is completely portable with folding mast. All necessary power units, air compressor, slush pump, and equipment are an integral part of this truck-mounted rig. The drill can be quickly switched to use either air or water as drilling conditions change.

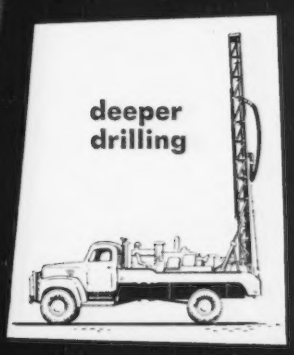
The rugged, dependable performance of Mayhew equipment has set new drilling records on the Plateau.

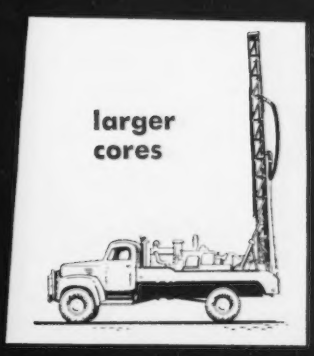
**Write, wire, or phone MAYHEW, manufacturers of portable rotary drilling equipment for over 36 years.**






Home Office

**MAYHEW SUPPLY CO., INC.**
4700 SCYENE ROAD, DALLAS, TEXAS

Branches

LUBBOCK, TEXAS; TULSA, OKLAHOMA; CASPER, WYOMING; SIDNEY, MONTANA; GRAND JUNCTION, COLORADO
EXPLORATION EQUIPMENT CO., INC., Houston, Texas

DALLAS MAYHEW TEXAS

At the same time, however, Justice okayed Dow's purchase of another Government magnesium plant at nearby Freeport. This was a physical extension to one of Dow's own magnesium plants; it was decided that the plant couldn't be run feasibly by another firm. Freeport, with capacity of 30,000 tons, is now Dow's sole producer. Both Freeport and Velasco are operating 'way below capacity.

Justice cites its 1947 ruling as the basis for holding up Dow's new purchase bid, suggests that GSA sell the plant to someone else. But GSA has had little luck. Alcoa, Kaiser Aluminum, Reynolds Metals, Bohn Aluminum, Harvey Machine, and Great Lakes Carbon have looked at Velasco, then turned thumbs down.

There are two main deterrents: (1) the market for magnesium is too limited to spur much investment in the metal; (2) operation of the Velasco magnesium facilities by another firm would be ticklish because the plant depends on Dow's adjoining power plants and other utilities.

Dow has not decided whether to renew its lease on Velasco. The firm plays down Justice's claim, says it's the sole producer only because other firms have been unwilling to gamble on magnesium. Talk about a Dow monopoly doesn't really mean much, it also argues, since magnesium is so hotly competitive with aluminum.

### Copper and Labor Politics

The recent copper strikes stirred up a high-level Washington rumpus over the release of some Government-held copper stocks to brass mills, wire mills, and foundries. Feeling the pinch during the last weeks of the strikes, the hard-up fabricators applied strong political pressure for such action.

Commerce Secretary Sinclair Weeks formally proposed the diversion of Government copper to industrial consumers at a meeting of the cabinet-level Defense Mobilization Board. Labor Secretary James Mitchell, however, objected. He said the Government should keep hands off until labor peace was restored in copper, that diversion of Government copper before the disputes were settled would be tagged as strikebreaking.

Mitchell also pooh-poohed the need for Washington to do something as a means to help copper-hungry defense contractors. He said that the defense take of copper is only about 10% of supplies, which would make it unnecessary for the Government to act under the guise of national security. Mitchell won both his points, and there was no Government action until the work stoppages halted.

Then, when the last union walkouts—at AS&R's smelter and Kennecott's refinery in Garfield, Utah—ended, ODM quickly stepped in. It authorized the sale of 17,500 tons of copper piled up under Government floor-price purchase commitments, which otherwise would have been dumped into the stockpile. GSA is now selling the copper to fabricators at the market price. Sales are limited to firms "facing shutdowns for lack of metal."

## LABOR THIS MONTH

**Alan E. Adams, McGraw-Hill Washington News Bureau**

**COPPER STRIKE EFFECTS FAR-REACHING:** The industry-wide strike by the International Mine-Mill and Smelter Workers Union had repercussions that extended far beyond the basic wage fight between the union and giant copper companies. It involved internal disputes within Mine-Mill in Montana—and internal disputes within the Eisenhower administration in Washington.

**HERE'S THE BACKGROUND:**

• The longest copper strike, against Anaconda Copper Mining Co., was extended because of a dispute between union locals dealing with Anaconda and Mine-Mill's international officers. The International insisted that the contract designate national Mine-Mill leaders as the bargaining agent rather than the locals. This was insisted upon to prevent any possibility of the locals breaking from the International to join the CIO Steelworkers. The Anaconda locals are among the strongest in the Mine-Mill chain.

But with a two-year contract under their belt, International Mine-Mill officials figure they can keep their ranks together. The chances are, that with continued raids by the CIO and AFL, more members will defect during this period. Since the Anaconda locals lost control of their contract, however, these defections will be minimized. It means Mine-Mill leaders are still in power—and they intend to stay there.

• The strikes were nearly over when the effects hit Washington. Loss of copper production hurt copper fabricators to the point where they appealed to the Defense Mobilization Agency, urging that copper supplies earmarked for the Federal stockpile be diverted to their uses. Then the trouble started.

Commerce Secretary Sinclair Weeks sided with the industry; he added his appeal that copper supplies be diverted. But Labor Secretary Mitchell fought the move, and won out. Mitchell and Weeks have clashed on other issues, but this one brought them face-to-face at a high-level conference where the Labor Secretary rammed home his point. He argued that turning Federal copper over to private industry during the strike would be a strike-breaking move—a dangerous step during a political campaign. Mitchell had another point; that it was Eisenhower administration policy to keep the Government out of labor disputes.

The Government then turned down the copper industry. But when the strikes were over, it promptly released copper.

**ANTI-RED UNION DRIVE TAKES HOLD:** The first effects of the Government's new attack on left-wing labor unions came with the resignation of Ben Gold, convicted Communist president of the Fur and Leather Workers Union. After Gold's conviction in court, the National Labor Relations Board moved to bar the union from benefits of the Taft-Hartley Act unless Gold quit his post. He refused at first, but finally stepped out under the pressure.

The Gold incident is the only development so far, however. The Justice Dept. is moving slowly under the new Communist control bill which empowers it to go after Communist-dominated labor unions. Justice attorneys are still working up cases against the suspect unions. When completed, the charges will be laid before the Subversive Activities Control Board.

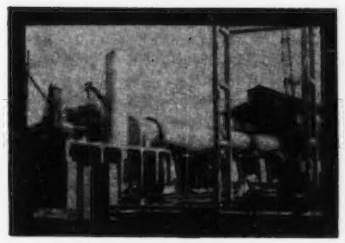
Mine-Mill is expected to be one of the first to be charged. The union can avoid the consequences of the law only by throwing out its alleged Communist leaders.

**LABOR UNITY IS COMING:** Merger of the AFL and CIO is a good possibility by the end of next year. It will bring together 145 affiliates of both federations, but will not include any independent unions, such as Mine-Mill.

MMSW leaders are still putting out feelers about possible merger with the AFL and CIO. But they're not getting anywhere.

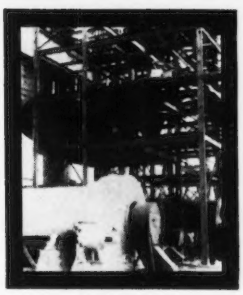
# KENNEDY MACHINERY AND EQUIPMENT

## TYPICAL KENNEDY INSTALLATIONS...



*MOZAMBIQUE:*
KVS 9′ x 11′ x 200′ kiln and cooler.

*Italcementi . . .*
*Calusco, Italy*
One, of two complete KVS crushing plants for Calusco, located at separate quarries.



*MOZAMBIQUE:*
KVS Wet mill and classifiers.

### PROVIDES NEW SOLUTIONS TO OLD PROBLEMS . . .

**Geared to Serve You Best!**

Throughout the world, for over half a century, leading cement, lime and mining plants selected KENNEDY machinery for its proven economy and its famous outstanding quality.

From the drafting boards, through foundry and machine shops to *installation*, every piece of KVS equipment is designed and manufactured to give years of continuous low cost service under the most severe operating conditions.

Consult us on your crushing, mining, cement or lime manufacturing problems—KVS has the "know-how" and experience to provide the right answer. Our sales-engineering department is available for consultation anywhere in the world.

### KENNEDY PRODUCTS

• Gyratory Crushers • Swing Jaw Crushers • Slugger Rolls
• Ball Mills • Vibrating Screens • Rock Feeders • Air Swept Tube Mills
• Preheaters, Deheaters • Coolers, Dryers
• Fans, Blowers • Hoists, Conveyors • Dust Collectors
• Classifiers • Pneumatic Transport System
• Complete Cement Plants • Waste Heat Boilers
• Pulverized Coal Firing Systems • Rotary Kilns

IT COSTS LESS . . . TO OWN THE BEST

SEND FOR BULLETINS . . .

# KENNEDY-VAN SAUN

Manufacturing and Engineering Corporation • Two Park Avenue, New York 16, N. Y. • Factory: Danville, Pa.

# What One Lady Does In San Francisco

MARGARET RALSTON, chief of McGraw-Hill's Pacific Coast News Bureau, had the time of her life covering the events arranged for the ladies who attended the meeting of the American Mining Congress in San Francisco, Sept. 20 to 24. It was only one of the many assignments she and her staff regularly handle for E&MJ.

A journalist by profession, and an Iowan by birth, Miss Ralston is a San Franciscan by deep burning conviction that there is no better place on earth in which to live. She is actually in love with the city, and no wonder.

She drives a bright blue convertible (see above), which is fun anywhere but more fun in San Francisco. In the course of her work, she does things like testing Aqua-Lungs in deep pools, climbing about on the faces of dams under construction, and reporting what Donald McLaughlin has to say on gold. She "copes" (her own expression) with the editors of a couple dozen McGraw-Hill publications, and she handles successfully the activities of a string of lively correspondents all over the West.

She is prepared at a moment's notice to get a story on anything going on anywhere in the Western states, including the activities pictured on p 76. She hopes you like the story half as much as she enjoyed getting it.

## Kongsberg Sölvverk

*(Continued from p 97)*

of this period were about 30-million kroner.

From 1889 the mine proper began showing a loss. This was a result of the unfortunate increase in labor cost, starting with 1860, and a severe drop in silver price, beginning at about 1875 as a result of the common change in Europe from bi-metallism to gold standard of coinage. The variations in cost of labor and in silver price are shown in Fig. 5.

Whereas Kongsberg Sölvverk might have mastered each of the two problems separately, the concurrence of them proved fatal for the works. The disastrous drop in silver value related to labor cost is shown in Fig. 6. It will be seen that the relative value of silver remained steady up to 1860, at a value per kilogram approximately equaling the value of 130 days of work. Today the relative value of silver is down to less than 5% of this figure, viz, 1 kg of silver equaling 4-5 days of work.

The drop in silver value has been met with extensive modernization as also shown in Fig. 6. This curve requires some comments, as the output of fine silver per man does not necessarily correspond with the output of ore per man, the former being also dependent upon grade of ore. High output per man in the period 1830-1890 was to a certain extent due to this. The years 1920-1930 also show a comparatively high output per man. This is only partly due to modernization. Chiefly it is due to high wages and low silver prices forcing production to be stepped up beyond the limits which the mines could stand. Thus development work suffered a serious setback, from which the mines have never recovered.

The following years up to the present have all suffered by the setback, caused by the forced production and lack of development work, particularly the years during and after the last war. During the last 2-3 years development has been stepped up at great costs, which together with new methods in the geological mapping of the mines has increased the amount of probable ore from about 1 yr supply in 1951 to 6-7 yr supply in 1953. At the same time the labor force has been reduced so that today 100 men are sufficient at a production that required 175 men in 1950. These figures refer to the mining division only.

Present methods at Kongsberg Sölvverk require a silver content in the ore of 350-400 g per ton (12-13 oz per ton) for the mining division to show a profit. Due to extended development during the last years, this content has dropped to below 300 g per ton, and it has consequently been impossible under these conditions even to show balance. Results in 1954 are expected to prove the justification of these expenditures.

## Letters

*(Continued from p 4)*

which are quoted on world markets in hard currencies. It can be noted, therefore, that prices for dynamite in Mexico have been affected principally by devaluations of the Mexican peso.

We trust that the above information will correct any erroneous ideas relative to dynamite cost in Mexico and we would appreciate your doing anything that is possible to bring the true facts of the situation to the attention of your readers.

FRANK B. LORETTA
*Cia. Mexicana de Explosivos, S.A.*
*Mexico 1, D. F.*

### Like Skinning A Cat

SIR:

With reference to "How Much Belt on a Roll" (*E&MJ*, June 1954, p 99), it is easier to measure the belt thickness than (it is) to count the turns (of belting around the roll).

If L equals length in feet; t equals thickness in inches; D, outer dia in feet; and d equals inner dia in feet, the following formula is used.

$$L = \frac{\pi \times 12}{4t}(D^2 - d^2) = \frac{3\pi}{t}(D^2 - d^2)$$

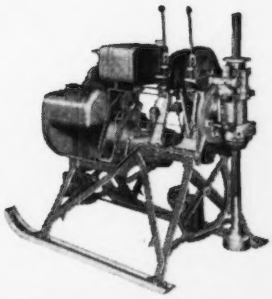
J. R. POWERS
*Starke, Fla.*

SIR:

Several years ago I came across (a simplified formula for measuring belt on a roll) in the Keystone Catalog. No. 6, 1926, p 234.

$$L = \frac{(d + D)}{2}\pi N$$

JOHN C. LOVING
*Asst. Concentrator Supt.*
*Cananea Consolidated Copper Co.*
*Cananea, Sonora, Mexico*

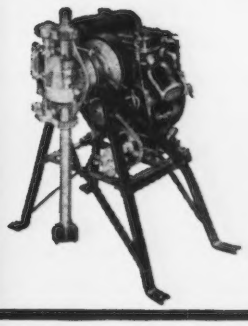


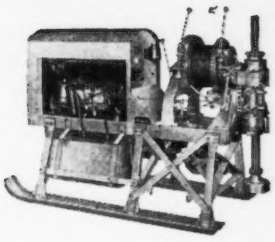
## BBS-1

World's best known surface drill. Handles "E" rods to 1000 ft. "A" to 800 ft.

## X-RAY

Compact, portable - - 185 lbs. net. Takes ¾" core to 200 ft. Low fuel consumption.



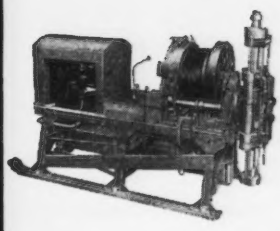


## BBS-2

Versatile, choice of 5 swivelheads. Depths to 2400 ft. Gas or diesel.

## BBS-4

Drills to 5000 ft. with "B" rods. Moves under own power. Gas or diesel.

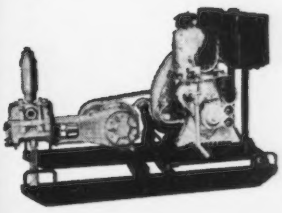


## PERMASET BITS

(Powdered metal). All standard sizes available from stock. Also reaming shells, etc.

## DRILL PUMPS

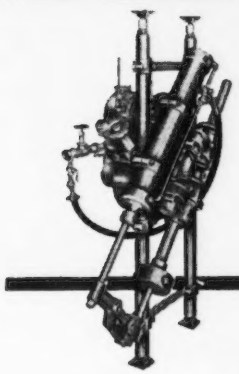
5-12 and 4-7 models. Capacities 400 to 1200 g.p.h. Diesel motor optional on 5-12.



If it's for **DIAMOND DRILLING** ...WE MAKE IT!

WE LOOK INTO THE EARTH

**BOYLES BROS**
DRILLING COMPANY LTD.
VANCOUVER, CANADA

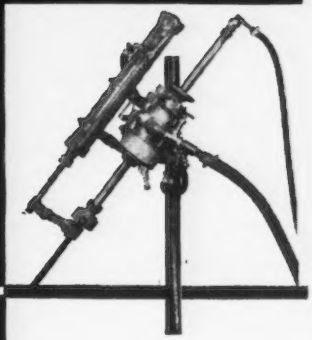


## BBU-2

Rugged. Capacity, 1800 ft. with "E" rods, 1400 with "A". Four gear feeds.

## VB and VC

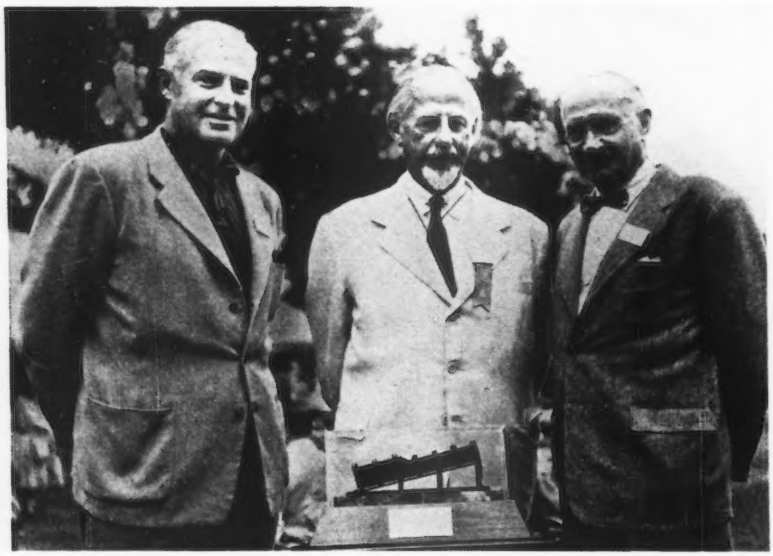
6" vane motor, 4 feed swivelhead. 2 forward 1 reverse speed transmission for blasthole or coring to 800 ft. (E size).



## JV

4 feed swivelhead. Capacity 800 ft. with "E" rods. JVR with reverse and right hand feed screw for blastholes.

# PERSONAL NEWS



**JOHN V. N. DORR** (center), founder and chairman of the Dorr Co., was presented with a scale model of the first Dorr classifier at a celebration of the 50th anniversary of its inception. **J. D. Hitch Jr.,** president of the company (left), and **E. R. Ramsey,** chairman of the board, made the presentation on behalf of the 100 members of the Dorr staff with the longest tenure of service.

**H. William Ahrenholz Jr.,** associate professor of mining engineering at West Virginia University, has left the teaching profession after a five-year period to become affiliated with New Jersey Zinc Co. where he had been employed from 1939-49. Prof. Ahrenholz will be in charge of the new Ivanhoe mine at Austinville, Va.

**C. A. P. Boundy** is now serving as geologist and field superintendent at Hill 50 Consolidated, in Australia.

**Langan W. Swent,** former assistant manager with San Luis Mining Co. at Tayoltita, Durango, Mex., is now administrative assistant to the general manager of Homestake Mining Co. at Lead, S.D.

**P. H. Jamieson** has been appointed manager of the Northern Territory division of Enterprise Exploration Co. Pty. Ltd at Rum Jungle.

**Dr. J. Brian Eby,** geologist, has been named a director of Texas International Sulphur Co. and vice president in charge of exploration at Tehuantepec, Mexico.

**Geoffrey M. Rollason,** general manager of Aluminum Co. of America, die casting division, has retired after 35 years service. He joined ALCOA as a research engineer in 1919.

**F. G. McCutcheon** has been appointed technical director of Eagle-Picher's mining and smelting division at Miami, Okla. He is succeeded as manager of the smelter at Henryetta, Okla., by **Charles Condren.**

**Merton I. Signer** was made mining engineer; **Howard J. Husing,** mine surveyor; **Robert H. Lane,** geologist; and **Adolph V. Mitterer, Jr.,** junior engineer, all at International Minerals and Chemical Corp.'s potash division at Carlsbad, N.M.

**A. L. Kennedy** is general manager and **C. O. Newey** assistant general manager at the mining and treatment operations of Northwest Tantalum N.L., Wodgina, Western Australia.

**F. R. Jones,** former chief engineer at Salmo, B.C. for Canadian Exploration Ltd., is now mine superintendent at the National Lead property at Tahawus, N.Y.

**A. D. C. Bayley,** superintendent of development, Consolidated Mining & Smelting Co. of Canada, Trail, B.C., is now assistant consulting metallurgist for Anglo-American Corp. of South Africa, Kitwe, Southern Rhodesia.

**R. R. Weideman,** former mine manager for Silver Dollar Mining Co., is now mine manager and superintendent for Inspiration Lead.

**Frank H. MacPherson** is now general manager of Dulaney Mining Co., Grand Junction, Colo. He was formerly director of the production division of the local AEC office.

**F. W. Godden** has retired as managing director of Bulolo Gold Dredging. He will make his home in Perth, Western Australia.

**Herbert A. Kursell** is acting as general consultant for Marcona Mining Co., W. R. Grace & Co. and Cerro de Pasco Corp., in Lima. He was formerly chief of exploration operations for AS&R.

**Ray C. White,** Silver City, N.M., is now industrial relations supervisor for Kennecott Copper's Chino division in Hurley and Santa Rita.

**Edwin B. Powell,** consulting engineer with Stone and Webster Engineering Corp., Boston, has been named to receive the ASME medal.

**W. C. Fothergill** is now on the engineering staff of Geco Mines, Ltd.

**Roy Jure,** formerly with Consolidated Mining and Smelting, at Yellowknife, is now with the American Metal Co., Toronto.

**David Austin,** formerly with Preston East Dome Mines, South Porcupine, Ont., has become mine foreman at Algom Uranium Mines, Algoma Mills.

Recent visitors to New Mexican potash mines were **H. Koetter** and **Friedrich Bessert,** of Kali-Chemie, Hanover, Germany, and **Cameron McLauchlan,** Anglo-American Corp., South Africa.

**M. A. Williamson** has joined the *American Metal Market* as chairman and publisher. Mr. Williamson brings more than 30 years' experience to his new post.

**August Nachant,** San Diego, Calif., was elected president by acclamation of the International Sourdough Association's meeting in Vancouver. He succeeds **Thomas A. Lamb,** Vancouver.

**A. L. Woods** has been appointed assistant to the vice president of metal sales for Calumet & Hecla, located at the executive offices in Chicago.

**F. R. Werther,** formerly of North Range Mining Co., at Ishpeming, Mich., is now in Duluth with Pickands, Mather & Co.

**R. G. Graham** is underground manager, Australian Development N.L., Tennant Creek, Northern Territory, Australia.

**Earl Farnham,** formerly of M. A. Hanna Co., has been promoted to manager of operations for Iron Ore Co. of Canada.

**Dr. Howard W. Barlow,** former dean of engineering, Texas A&M, has assumed his duties as director of Washington State Institute of Technology. Dean Barlow succeeds **Dr. William A. Pearl,** who resigned last January to become administrator of the Bonneville Power Administration.

**R. Gordon Walker,** vice president and general sales manager of Oliver United Filters, Inc., retired on Aug. 31, 1954.

**Walter K. Scheibe** has been named division engineer of Reserve Mining Co.'s taconite concentration plant at Babbitt, Minn.

The following personnel changes at New York and Honduras Rosario Mining Co. have been announced by **R. M. Reininger,** president: **R. W. Price,** former manager of the El Mochito mine, Honduras,

***LOOK what they're saying about***

# ANACONDA SECURITYFLEX* SHOVEL CABLE

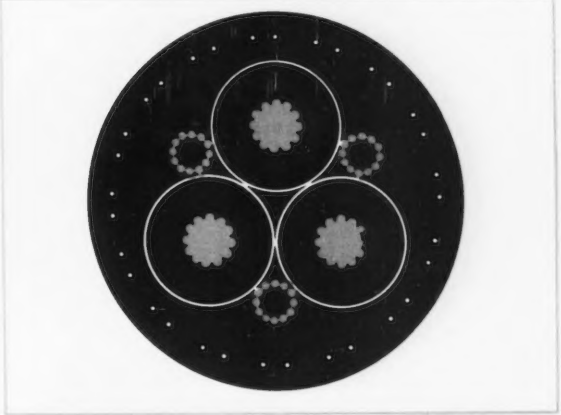
**GENERAL MANAGER:**
"This cable saves us money . . . there are far fewer breaks . . . and far fewer shorts from ground wires."

**MINE ENGINEER:**
"No matter how we run it over rocks, it holds up well. It must be the jacket. It wears like iron."

**MINE FOREMAN:**
"Securityflex sure is flexible . . . mighty easy to handle, too . . . the toughest cable we've ever used."

**MINE SUPERINTENDENT:**
"Our men can splice Securityflex easily and in less time. That saves us on down-time."

These are the things Anaconda salesmen hear daily about Securityflex Type SH-D Shovel Cable. Why not see *your* Anaconda Sales Office or Distributor for full information about this cable? *Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.* *Trade Mark 54338



**AND THE REASON USERS CAN SAY THIS IS BECAUSE:**

- **New BUTYL INSULATION provides better resistance to heat, moisture and damage by compression**
- **New NEOPRENE JACKET is tougher and more abrasion resistant**
- **RUBBER CORES cushion the ground wires . . . help prevent broken wires**
- **New COPPER-COTTON SHIELD is easier to splice**

***the right cable for the job***

ANACONDA®

**WIRE AND CABLE**

**HON. MAURICE DUPLESSIS,** Premier of the province of Quebec, pressed the button which started Johns-Manville's new mill at Asbestos, Que., on Sept. 30. Speaking at the dedicatory ceremony, M. Duplessis called the new mill remarkable for the combination of material achievement and employee welfare.

is now general manager of Central American operations, succeeding **Frank H. Stephens,** retired. **David L. Moore,** former chief geologist at El Mochito, is now chief geologist, exploration division, Grand Junction, Colo. **H. H. Winger,** accountant at Rosario mine, is now agent for the exploration division at Grand Junction. **Richard M. Vosburg** has been named chief geologist and **Frank L. Greene,** assistant geologist, at El Mochito.

**Ben R. Coil** has been promoted to manager of Miami Copper Co. and Copper Cities Mining Co. at Miami, Ariz. Mr. Coil had been assistant general manager under **R. W. Hughes,** vice-president and general manager.

**A. Perry Mason** is now with the McLain Fire Brick Co., a division of H. K. Porter Co., Inc., as mining engineer.

**John D. Vogel** is now serving with the U.S. Army Signal Corps, stationed at White Sands Proving Ground, N.M.

**R. R. Beard,** geologist with the raw materials division of the AEC, is in Lima, Peru, where he is in charge of a uranium exploration program which the U.S. is carrying out in Latin America.

**Donald B. Achttien** is now serving with the engineers division of the USAF in Japan.

**W. C. Peper,** assistant treasurer of the M. A. Hanna Co, Cleveland, will serve as vice chairman of the Mining and Extractive Industry Conference, to be held in conjunction with the 23rd annual National Conference of Controllers Institute of America in Chicago, Oct. 10.

**Albert Pratt,** a partner in the firm of Paine, Webber, Jackson & Curtis, and **Walter Hochschild,** president of American Metal Co., Ltd., were elected directors of Copper Range Co.

**H. L. Hazen,** for the past two years metallurgical consultant for the AEC, has completed that contract and opened his own uranium consulting office in Grand Junction, Colo.

**D. F. Cooper,** Sudbury (Northern Ontario) inspector of mines, took over his new office in Toronto as mine assessor for the province Dept. of Mines. He succeeds **A. R. Crozier.**

**Chester M. F. Peters,** mining geologist and engineer, has transferred his office from San Francisco to Salt Lake City and is now doing consulting work, principally in uranium.

**E. Rowland Tragitt,** formerly supervising valuation engineer (mining) for the Calif.-Nev. region, Bureau of Land Management, San Francisco, is now land and minerals officer for the Bureau in Arizona, with headquarters at Phoenix.

**Bernardo Pizarro A.** has been transferred to take charge of the mining and fuel department of Corporación de Fomento de la Producción, Santiago de Chile.

**Warren M. Mahan,** former sinter plant superintendent at the USBM alumina plant operation, was transferred at the completion of that project to the USBM station in Pittsburgh, Pa., where he is supervising extractive metallurgist in the pyrometallurgy branch.

**C. E. Bartlett,** Utah mining engineer, has been assigned by USBM as a Point 4 consultant to the Agricultural and Industrial Development Bank of Cuba, to supervise the installation of a minerals investigation laboratory there.

**William E. Quigley,** Butte, Mont., has been elected assistant secretary and assistant treasurer of Anaconda Copper Mining Co., to fill the vacancy caused by the death of **Kenneth B. Fraser** in June of this year. **David R. Nelson,** former chief metallurgical accountant, becomes chief assistant to Mr. Quigley.

**Jerome G. Murkve** is now with the Oliver Iron Mining division at Virginia, Minn.

**Robert M. Brown,** district sales representative for Euclid division of GM, is now located in Hibbing, Minn. He succeeds **J. W. Bloomquist,** who became domestic sales manager at Cleveland.

**Dr. James Boyd,** exploration manager of Kennecott Copper Corp., Denver, and former director of USBM, will address the eighth annual Midwestern meeting of the Society of Exploration Geophysicists on Nov. 18, in Dallas, Tex.

**Wallace Kelly,** Salt Lake, is president of the reorganized Lakeside Monarch Mining Co.; **Hubert Wolfe** is vice president and **L. D. Tannenbaum,** secretary-treasurer.

**Geraldo Melcher is** on the staff of a geological project in the Ribiera Valley of Brazil.

**W. G. Lee** is now mining engineer at Electrolytic Zinc Co. of Australasia Ltd., Rosebery.

## OBITUARIES

**Frank J. Silva,** 61, a mining engineer associated with Singmaster & Breyer, of New York City, died Sept. 15 at his home in Mountainside, N. J., of a heart attack. Prior to going with the New York firm, Mr. Silva had been chief engineer at Nicaro Nickel in Cuba.

**Lee K. Coffin,** pioneer Quebec prospector, died in Montreal. He was one of the original stakers of East Malartic, Barnat and Norbeau.

**C. J. "Jack" Abrams,** 64, director of explorations division, Climax Molybdenum, died Oct. 17 at his home in Denver.

**John M. Hoff Sr.,** 62, who retired as president of Willow Valley Mines Co., Nevada City, Calif., a few months ago, died July 22.

**W. R. Hamilton,** 73, retired mining engineer, died May 4 at Salt Lake City.

**Alex Ranson,** 83, well-known developer of Nevada mine properties, passed away in July 1954 at his home in Reno.

**McNeeley L. Clement,** chief accountant at the Carlsbad operation of International Minerals & Chemical Corp., died Aug. 28. He had been with IMCC for 35 years.

**Sen. Patrick McCarran,** 78, died suddenly at Hawthorne, Nev., on Sept. 28, 1954, following a heart attack. A member of the Senate for nearly 22 years, he supported and sponsored a number of mining bills.

**Leschen engineers tell you how to determine**

# Proper Use of Wire Rope with Wire Rope Core

*First, what is it?* It is a completely metallic rope made with a separate wire rope as a core, instead of the usual fiber core.

*Why is it used?* The steel core resists extreme pressure of individual strands on the core under very heavy loads. Here, a Red-Strand steel core rope substantially outlasts a fiber core rope. The extra steel in the core increases rope strength and safety by 7½%, compared with wire rope with fiber core. For occasional heavier loads this eliminates time and expense of changing sheaves, blocks and equipment to suit a bigger fiber core rope.

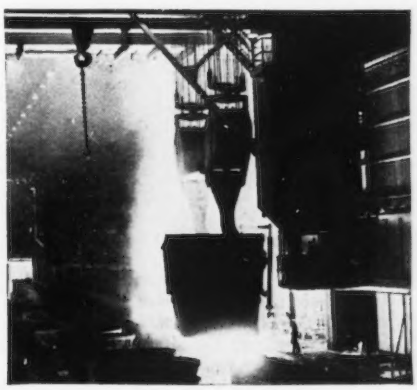
Red-Strand steel core rope answers the problem of crushing when rope is spooled in multiple layers on small diameter drums and winches—or when heavy loads are dragged or pulled. It also resists the damaging effects of excessive heat.

*Where is it used?* For extra strength and to resist heavy load pressure: on shovel and draglines—for drag, hoist, crowd and frequently boom ropes; on dredges, trench hoes, cranes and similar heavy duty equipment. To resist crushing: on bulldozers, scrapers, coal cutters, coal loaders, logging, arch and choker lines, and on rotary drilling lines. To resist excessive heat: on hot ladle cranes.

*Which make should you use?* Red-Strand steel core wire rope is highly recommended by its users for its higher-than-rated quality and longer-than-expected service. That saves money.

*What's the next step?* Talk to your Leschen distributor or Leschen field man. They're well qualified to answer your specific questions about Red-Strand steel core wire rope—or to help solve other wire rope problems. That means profit for you.

Severe stress, pressure and crushing occur on wire rope jobs like this and on rotary drilling drums and winches. On these jobs it pays to use higher-than-rated quality Hercules Red-Strand wire rope with wire rope core.



Where tons of molten steel are to be lifted by wire rope, great strength and resistance to intense heat are required. Here Hercules Flattened Strand wire rope with wire rope core delivers much longer-than-expected service.

Hercules Red-Strand wire rope made by

**LESCHEN WIRE ROPE DIVISION**

THE WATSON-STILLMAN COMPANY

(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)

St. Louis 12, Missouri

# THIS MONTH IN MINING

(*U.S. Potash Co. photo*)

(*Custom Pictures, Carlsbad*)

**Dr. Alberto F. Thompson** (left), chief, technical information service, AEC, chats with **A. J. Thompson,** new president of New Mexico Mining Association, and **O. Paul Lance,** president of Southwest International Mining Association (right). **Visitors from Mexico** (photo right) to the convention were **Ing. Jorge Nieto Casas,** assistant to general director, Comision de Fomento Minero; **Ing. Salvador Cortes Obregon,** director general, Instituto Nacional de Recursos Minerales; **Lic. Alberto Terrones Benitez,** Senator, State of Durango and president of the Senate mining commission; **Ing. Gustavo P. Serrano,** president, Mining Chamber; and **Ing. David Segura y Gama,** director general de Minas and Secretaria de Economica.

## AEC, Industry Leaders Speak at Carlsbad

(*U.S. Potash Co. photo*)

**Gathered around replica** of prospector's mule are (left to right): **Carl Arend, Jr.,** resident manager, IM&CC; **H. H. Bruhn,** resident manager, U. S. Potash; **Jerry Tong,** assistant resident manager, Duval Potash and Chemical Corp.; **R. R. Knill,** engineer, Potash Co. of America; and **Auwbrey Smith,** assistant resident manager, Southwest Potash Corp. These men represent the five principal potash producing companies in the U. S.

URANIUM, labor relations and the applications of electric equipment to mining corraled the attention of nearly 500 registrants at the joint convention of New Mexico Mining Association and Southwest International Mining Association, held in Carlsbad, N. M., Oct. 14 to 16.

At the welcoming luncheon, Dr. Alberto F. Thompson, chief, technical information service, AEC, Washington, discussed "Coming Applications of Atomic Energy." Atomic energy will be shouldering 15% of the nation's power requirements by the year 2000, Dr. Thompson estimated, and nuclear energy will begin making power contributions by 1960.

In addition to power, Dr. Thompson said that commercial developments in atomic power will produce three other types of products for sale: fissionable materials, radiation in various forms, and radioisotopes.

Impact of Dr. Thompson's talk increased interest in another session the same afternoon on "Uranium Prospecting in New Mexico," by Harold D. Wolfe, chief, Albuquerque sub-office, Division of Raw Materials, AEC, and William A. Carlson, geologist, Grand Junction AEC operations office.

Wolfe and Carlson said that "Prospecting activities in the past two years have been extended from present production centers to outlying areas of the state. A large number of uranium-bearing areas have been discovered at widely-dispersed points. Initial production has been started from two districts and it is anticipated that production will be forthcoming from several additional districts in the state within the coming year."

R. B. Moore, General Electric Co., Schenectady, N. Y., stressed the importance of integrating power drive with available power supply in his talk on "Electric Equipment Applications in Mining."

"Except for outright failures of electrical equipment, the actual root of power trouble usually lies in an inadequate power supply system or in the failure to allow for power supply system weaknesses when the electric drive equipment is applied," Moore pointed out.

Dr. W. E. Shoupp, assistant manager, Atomic Power division, Westinghouse Electric Corp., gave an illustrated talk on "Development of Reactor and Other Phases of the Utilization of Atomic Energy."

Paul M. Leach, midwest manager, Extension division, E. I. du Pont de Nemours & Co., Inc., discussed "Problems of Public Relations Facing Business."

W. H. Goodrich, general manager, Kennecott Copper Corp., Chino Mines division, treated in general terms the topic, "Base Metals and Some Problems."

Dr. Robert D. Gray, California Institute of Technology, moderated at a public relations and labor forum. Panel members were Plato Papps, general counsel, International Association of Machinists, Washington, D. C.; Milton

C. Denbo, of Poole, Schroyer & Denbo, Washington, D. C., and Dean Stahmann, Las Cruces, N. M.

At a closing session, A. J. Thompson, New Mexico Institute of Mining and Technology, Socorro, was elected president of the New Mexico Mining Association. Thompson, who served last year as second vice president, succeeded W. Page Morris, Duval Sulphur & Potash Co. Mr. Morris, who was still recuperating from a recent operation in Houston, was unable to attend the convention. He has just been transferred to Houston, to serve as vice president and assistant general manager of Duval. Morris was named honorary director of NMMA for the coming year.

Other officers elected included J. B. Knaebel, Anaconda Copper Mining Co., Grants, first vice president; and J. T. Lewis, Jr., U. S. Smelting, Refining and Mining Co., Vanadium, second vice president.

A "Ranch Style" breakfast began the closing day of the convention. Later, delegates visited the famed Carlsbad Caverns or toured the nearby potash mines, which range from 750 to 1350 ft in depth and produce 90% of the nation's output.

## Inco Begins Production Of Electrolytic Cobalt

INTERNATIONAL NICKEL COMPANY of Canada Ltd. has begun production of electrolytic cobalt at its Port Colborne, Ontario, refinery.

Ralph D. Parker, general manager of Canadian operations and assistant vice president of Inco, said that this is the first commercial production of electrolytic cobalt in Canada. Heretofore, Inco's entire cobalt output has been marketed as oxides and salts produced at its Clydach, Wales, refinery.

## New Process Simplifies Th, Rare Earths Recovery

A NEW PROCESS for recovery of thorium and rare earths from monazite sands has been developed by Battelle Memorial Institute, Columbus, Ohio, under a research project sponsored by the Atomic Energy Commission.

The new process permits early removal of phosphates present in the sand and is thus said to simplify subsequent separation and purification of thorium and rare earths.

In the new process, the following five operations are essential:

- Reaction of the monazite sand with a hot concentrated aqueous solution of sodium hydroxide. This converts the metal phosphates of the sand to hydrous metal oxides and trisodium phosphate;
- Separation of the hydrous metal oxides from the dissolved sodium phosphate and excess sodium hydroxide;
- Dissolution of the hydrous metal oxides in hydrochloric acid;
- Precipitation of a thorium product by partial neutralization of the acid solution;
- Subsequent precipitation of a high-grade rare earth hydroxide product by further neutralization of the chloride solution.

Conventional process, now in use in the rare earth industry in the United States, breaks down monazite sand through treatment first with sulphuric acid and then with water. The resulting solution, however, contains nearly all phosphate in the sand. Presence of the phosphate complicates recovery of thorium and the rare earths.

Under the new process, monazite sands are treated first with sodium hydroxide and then with hydrochloric acid. These agents permit removal, at an early stage, of phosphate present in the sand. Thus, subsequent separation and purification of thorium and the rare earths is simplified. Battelle has carried out the new process on a small pilot-plant scale.

It is hoped that the simplicity of the new process may be a factor in developing new markets for thorium and the rare earths. Thorium metal is of interest in connection with nuclear "breeder" reactors.

Best-known deposits of monazite are the beach sands of Brazil and India. Also, there is some monazite in Florida and Idaho and in other parts of the United States.

## Republic Steel Sells Mine to North Range Mining Co.

REPUBLIC STEEL CORP. has sold the Penokee iron mine, Ironwood, Mich., to North Range Mining, Negaunee, in what may be the first of a number of such transactions between steel-producing mine owners and independent producers.

Steel producing companies with big investments in taconite beneficiation plants and in Canada and Latin America will naturally accept all available ore from those sources and, if necessary, curtail or dispense with operation of their present high-cost mines in the Lake Superior area. Small independents, like North Range, can often operate such properties at far less cost.

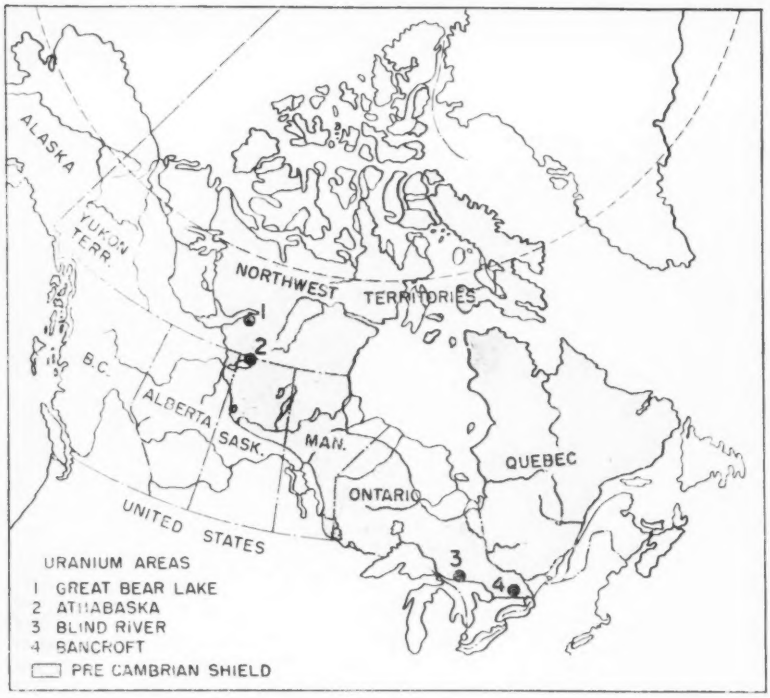
Oglebay, Norton & Co., Cleveland, will act as sales agent for 400,000 tons of rich high grade underground ore which North Range expects to produce from the Penokee, which has reserves of about 3-million gross tons. Republic has agreed to purchase half of production for the next 3 yr.

Penokee is the second such mine taken over by North Range within the past several months. The underground portion of Leonidas mine, in Minnesota, was previously acquired from Oliver Iron Mining Div., U. S. Steel. Output there has reportedly been sold to the Zenith furnace, Duluth.

For more news on activities in the Michigan and Minnesota iron areas, see p 146.

## New USBM Laboratory Dedicated

**Participating in dedication** of Bureau of Mines experiment station at Reno on Sept. 25 were **Felix A. Wormser,** assistant secretary for mineral resources of the Department of the Interior, Washington, D. C., and the late **Sen. Pat McCarran,** of Nevada. Laboratory is located on the campus of the University of Nevada and contains 57,000 sq ft of lab and office space. It will serve as an experiment station for rare and precious metals. Mining leaders attending the dedication also heard Jesse C. Johnson, manager of raw materials division, AEC, at a luncheon in Reno following the ceremony.




*"So far uranium deposits of proved economic importance have all been found on the perimeter of the Shield."*—R. J. Henry.

## Eldorado Official Outlines Canada Uranium Position

"WE BELIEVE in Canada we have available the natural resources to produce the uranium we require for our own needs for many years to come, and that for some considerable time we expect to be able to export and, if necessary, sell on a world market." In these words, R. J. Henry, vice president of mining and exploration, Eldorado Mining and Refining, Ltd., summed up the significance of past and current Canadian uranium discoveries in a panel discussion held by the Economic Conference Board in New York Oct. 13. Mr. Henry's paper is summarized in part as follows:

All uranium deposits of proved economic importance to date have been discovered on the perimeter of the famous Canadian Pre-Cambrian Shield. (See map.) First discovery was made in 1930 on the shores of Great Bear Lake where Eldorado Mining and Refining, Ltd. (a Crown company), is now producing about 175 tons of ore per day. Tailings from the gravity mill are combined with an equal amount of old tailings to be treated by acid leaching.

In 1947 the Crown company of Eldorado, assisted by the Geological Survey of Canada, discovered the Beaverlodge field in Northwestern Saskatchewan on the north shore of Lake Athabaska. This search resulted in the development of the Ace mine which now produces ore for a 500-ton basic-leach plant. A second major discovery in this area by private interests is the Gunnar deposit which consists of a massive flat-dipping pipe-like orebody extending down the dip for a known distance of 1400 ft. Gunnar is building a 1,250-ton plant scheduled for operation in 1955 which will employ the acid-leach process.

The Blind River field, discovered in 1953, appears to be second only to Athabasca It lies about midway between Sudbury and Sault Ste. Marie. Here the Pronto mine is designing a 1000-ton acid-leach plant to go into production late in 1955, and several other large-tonnage prospects are under development. The chief uranium mineral is brannerite, a combination of uranium and titanium. This is found disseminated in a bed of conglomerate associated with considerable pyrite. The conglomerate, which has been traced for many miles, resembles the Witwatersrand gold reefs somewhat. Concentrations of uranium, occurring at intervals along this formation are all relatively low grade, but the location of the area and the low acid consumption required to recover the uranium are expected to reduce working costs.

At Bancroft, in Southern Ontario, several companies are developing medium-size low-grade deposits containing disseminated uranium which may prove economic. The ore also contains thorium.

At North Bay a discovery has been made of a deposit believed to contain large amounts of columbium, tantalum, and low-grade uranium values.

Currently some 1000 prospects are known in Canada, and new ones are being reported each month. Since 1947, Government policy has encouraged production of uranium by private industry.

## News Highlights

**Peru will sell uranium** ores to the AEC under an agreement signed by the U.S. and that nation. Page 125

**Electro-Metallurgical Co.** has let contracts for its $31.5-million titanium sponge plant. Page 126

Manganese depot at Wenden, Ariz., has announced new operating schedules; 7 am to 7 pm on weekdays. Page 127

**Lila King Mining Co.** has struck "clear, good water" on the California Rand. Page 128

**Consolidated Uranium Mines, Inc.,** has taken over four independent uranium companies. Page 128

**Camoose Mines, in a "multi-million dollar deal",** has purchased the Montrose County, Colo., holdings of J. R. Simplot Co. Page 130

**Colorado State highway engineer** has been informed by the Federal Bureau of Public Roads that $1.3-million will be made available for new roads. Page 134

**Orebody at least 1000 ft long and 150 ft wide** is indicated at the holdings of U&I Uranium Inc., operating firm for six Kellogg, Idaho, mining companies, located in the Big Indian Wash area of Utah. Page 140

**Two Hardin County, Ill.,** fluorspar properties of Ozark-Mahoning Co. have reopened after a four-months shutdown. Page 142

**Shipments of Lake Superior** iron ore for 1954 are almost 27-million tons below the same date last year. Page 146

**Calumet & Hecla** has purchased most of the mining equipment and material of Summit King property in Tonopah, Nev., and plans further exploration. Page 147

**Longest conveyor system in the U.S.** has been contracted for with Hewitt-Robins, Inc. by Potash Company of America. Page 148

**Mica deliveries at the GSA depot** at Spruce Pine, N.C., have picked up considerably during the past few months. Page 148

**9300 acres of public land in the Calf Mesa area,** Utah, have been returned to the public domain. Page 150

**Vitro Uranium Co.** is planning an extensive drilling program on 57 claims in Fremont County, Wyo. Page 152

**Cariboo Gold Quartz** has taken over the Island Mountain mine. Page 154

**Recent investigation** estimates Peace River iron ore deposits in Alberta at one billion tons. Page 164

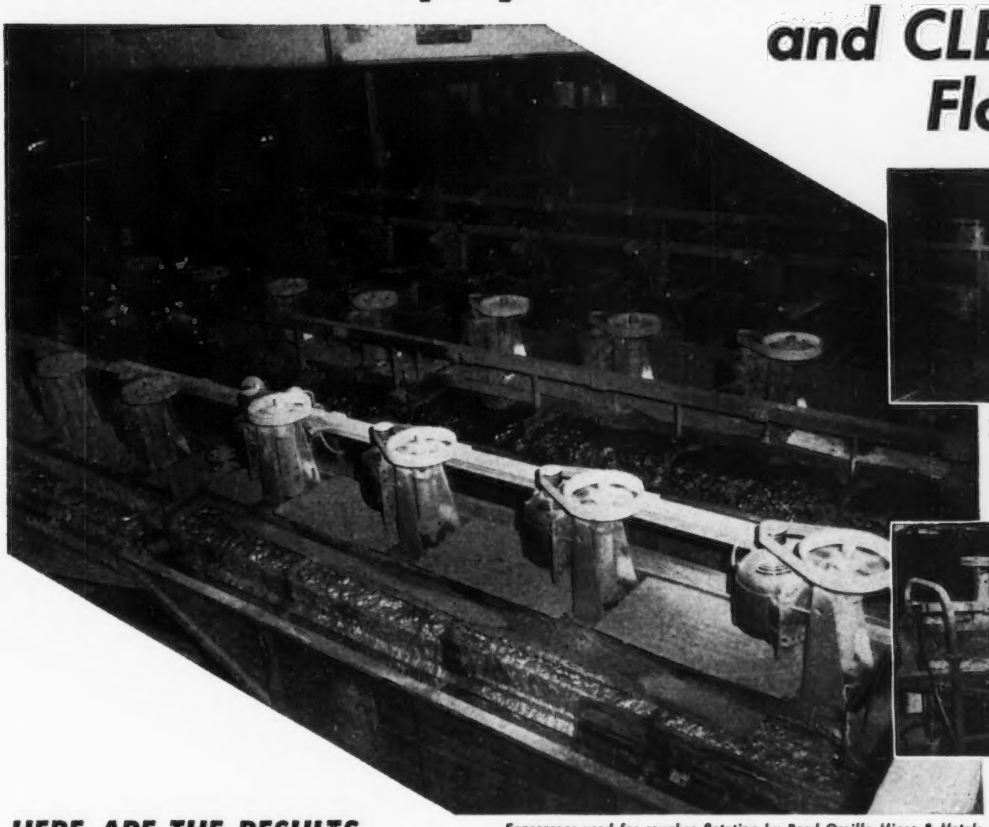
**Increased activity in mercury** in Mexico has resulted from U.S. support of the market. Page 168

**New coal field find in Brazil** is deemed important to that nation's iron and steel industry. Page 176

**Russian technicians** are reported mining for industrial diamonds in India. Page 178

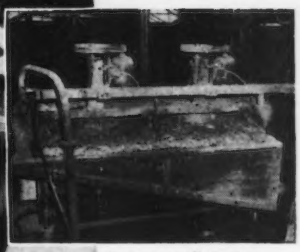
**Bethlehem Steel** says it has discovered two vast iron ore deposits in southwest Africa. Page 194

# FAGERGRENS *pay off in both ROUGHER and CLEANER Flotation*



*Fagergrens used for rougher flotation by Pend Oreille Mines & Metals Co., Metalline Falls, Wash. Zinc circuit in foreground, lead circuit in center; duplicate circuits being installed in background.*

*Fagergren cells in lead cleaner flotation circuit.*



*Fagergren cells in zinc cleaner flotation circuit.*

## *HERE ARE THE RESULTS OBTAINED BY A MAJOR LEAD-ZINC PRODUCER*

48 Fagergren Flotation Machines are used by Pend Oreille Mines & Metals Co. in flotation circuits having a capacity of 1600 tons per day. The ore is hard and abrasive with lead (as galena) occurring in coarse crystals and zinc (as sphalerite) finely disseminated in the gangue. Specific gravity of ore is 2.7 to 2.8.

Fagergren's highly efficient performance in this application produces superior metallurgical results, as follows:

1. Lead concentrate grade averaging well over 70% lead.
2. Zinc concentrate grade running close to 60% zinc.
3. Recoveries of approximately 95% lead and zinc in respective concentrates.
4. Exceptionally low lead and zinc tailing assays.

**High Metallurgical Efficiency,** as demonstrated above, is not unusual with Fagergrens. It is based on the faster rate of flotation and greater flotation recovery made possible by Fagergren's exclusive Rotor-Stator design. This superior agitating mechanism is unmatched for effective pulp circulation and aeration with resulting greater capacity per cubic foot of cell volume and higher mineral recovery.

Specify Fagergrens for your next installation or as replacements for older, less efficient machines. Send today for free copy of Fagergren descriptive bulletin and for recommendations concerning your flotation problem.

**PRINCIPAL OFFICES**
San Francisco • Sacramento
Salt Lake City • Spokane
Denver • Phoenix
Chicago • Hibbing, Minnesota
New York • Birmingham
Toronto, Canada
Jeffersonville, Indiana

**EXPORT DISTRIBUTORS**
Fraser & Chalmers (S.A.) (Pty.) Limited
P. O. Box 619, Johannesburg, South Africa
Lilestone & Co., Inc.
P. O. Box 3368, Manila, Philippines
United Development Corporation Pty. Ltd.
P. O. Box 3460, Sydney, N.S.W., Australia
Corporation Commercial Sudamericana S.A.
Casilla 505, Lima, Peru

**WEMCO**
WESTERN MACHINERY COMPANY
760-766 FOLSOM STREET SAN FRANCISCO 7, CALIFORNIA

*Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps • Agitators*
*Cone Separators • Drum Separators • Hydroseparators • Fagergren Laboratory Units*
*Fagergren & Steffensen Flotation Machines • S-H Classifiers • Attrition Machines*
*HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Densifiers*

# BREAKING THROUGH TO NEW HIGHS WITH THE NEW U. S. SUPER USTEX-

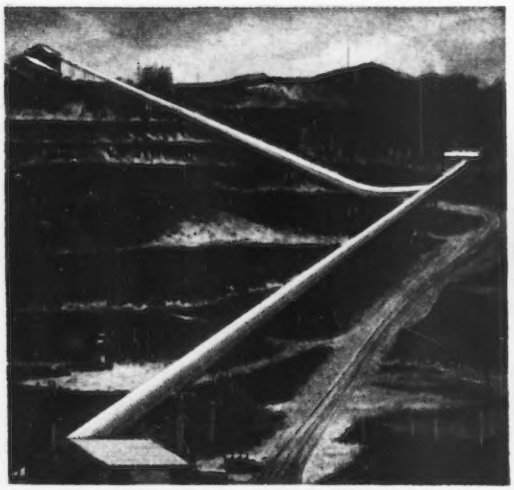
*for higher and higher lifts*

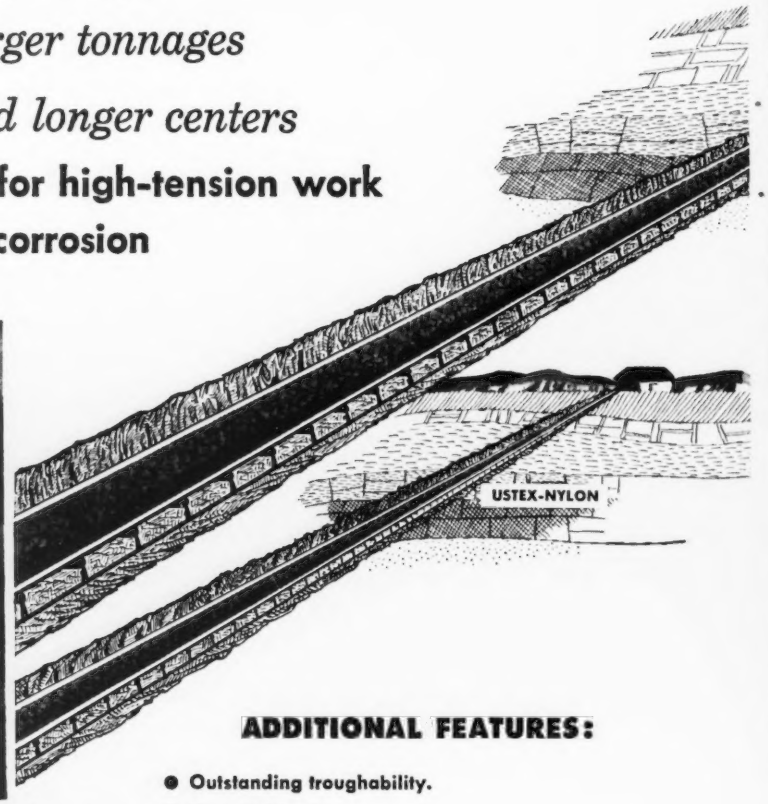
*larger and larger tonnages*

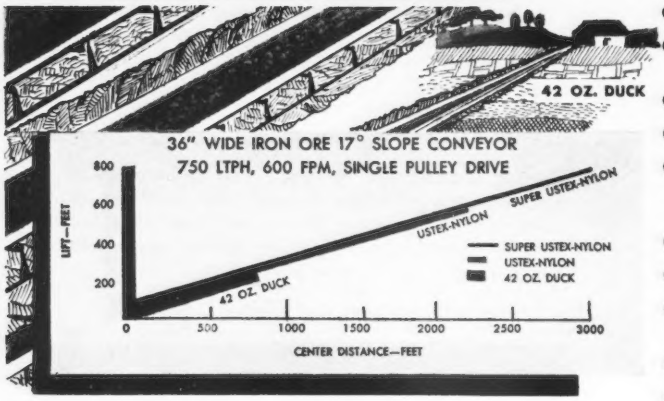
*longer and longer centers*

**The high-strength belt for high-tension work**

**— — not affected by corrosion**






**ADDITIONAL FEATURES:**

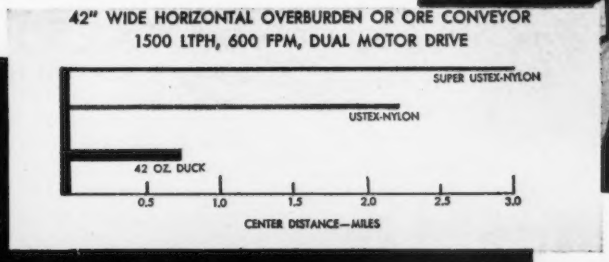
- Outstanding troughability.
- Easy training.
- High resilience dissipates shock and impact strains.
- Optimum elastic stretch.
- Homogeneous construction.
- High transverse strength, proper load support, resistance to longitudinal cuts and tears, resistance to flexing fatigue.
- Low permanent stretch.
- High safety factor.
- Easy to splice— no special skills, techniques or materials required.
- Belt tension distributed evenly through entire carcass.
- A patented construction exclusive with United States Rubber Company.
- Mildew-inhibited.

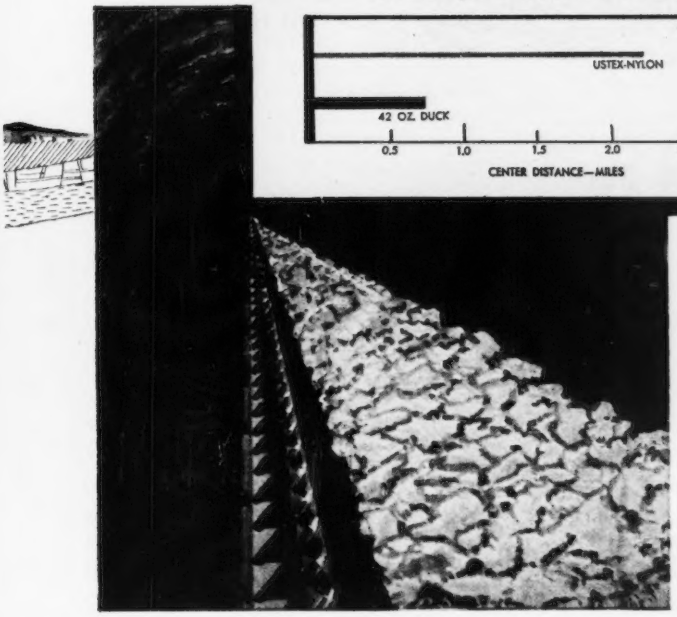
US RUBBER

**UNITED STATES RUBBER COMPANY**

**MECHANICAL GOODS DIVISION**

# NYLON BELT!



This great new Super Ustex-Nylon Belt is the latest in United States Rubber Company's parade of Belt Champions.

In 1929, "U. S." gave mine haulage a history-making lift—by presenting the 42-oz. duck belt, later to become standard in the industry.

In 1939, "U. S." came out with the strongest belt ever made up to that time—the famous 48-oz. duck belt. So strong was this belt that the first one installed is still in active service.

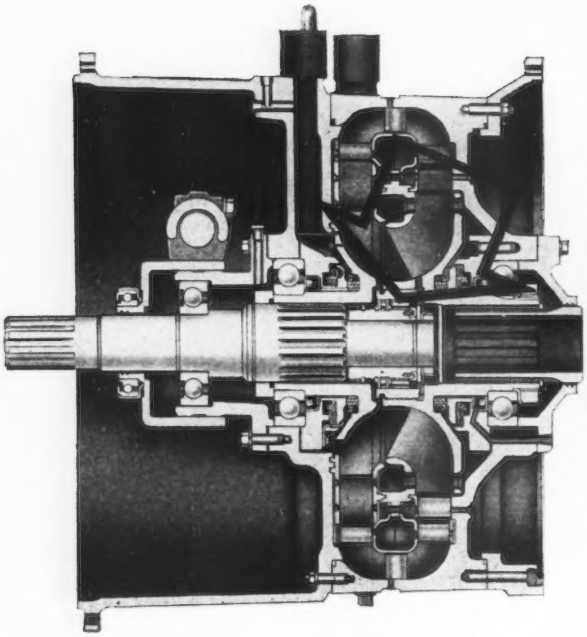
In 1948, still anticipating that in the years ahead mine operators would find it necessary to haul ever-increasing tonnage up higher and higher lifts, "U. S." introduced the Ustex-Nylon Belt—to handle the great tensions that were undreamed-of years before. The first of these belts was installed in a Minnesota iron mine where it carried over 7,500,000 long tons of ore at a rate of 700 long tons per hour for several years. It was then moved to a new location and now handles 1,200 long tons per hour up a higher lift. In other words, the belt is doing twice the work it was originally designed for.

And now, in 1954, again the Iron Range takes advantage of our Three-way Engineering. A leading original equipment manufacturer specifies our latest champion, the Super Ustex-Nylon Belt for one of the foremost iron ore producers.

There is always a "U. S." sales engineer ready to work out haulage problems for you through Three-Way Engineering—the "U. S." method of working with mine engineers and the designers of conveyor equipment. Consult any of the 27 "U. S." District Sales Offices, or write to address below.

***"U. S." Research perfects it..."U. S." Production builds it ... U. S. Industry depends on it...***

**ROCKEFELLER CENTER, NEW YORK 20, N. Y.**



Twin Disc freewheel locks impeller and turbine together to provide absorption of braking horsepower by the converter. In locking the impeller to the turbine, the freewheel forces the truck's driving axle to turn the converter pump wheel—providing smooth, powerful Hydrodynamic Braking.

# The Torque Converter with *Built-in Braking!*

When you specify torque converters for your heavy-duty off-highway trucks, be sure to get the *extra* advantages of Twin Disc Three-Stage Truck-Type design, with *built-in* Hydrodynamic Braking *at no extra cost.*

Pioneered by the Twin Disc Clutch Company, Hydrodynamic Braking in the Model CF Torque Converter is actuated automatically when the operator lets up on the accelerator. No accessory equipment or additional cooling system for braking is required.

Here is the most effective Torque Converter downhill retarding ever developed . . . smooth, effortless braking that gives your operators *complete control all the way down.* And by combining built-in Hydrodynamic Braking with friction braking of the engine, Twin Disc offers *maximum* downhill retarding *without shock-loading the transmission.*

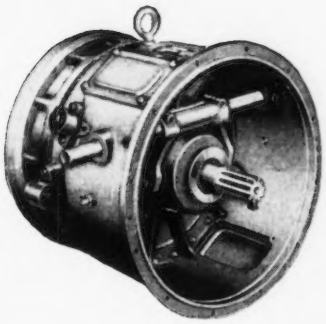
Add the powerful torque multiplication of Twin Disc Three-Stage design (up to 6:1 at stall, highest in the field) and you have virtual *elimination* of uphill shifting as well as of downhill pedal-braking . . . providing *faster work-cycles with more payloads hauled per day—lower ton-mile costs*—and *savings on engine, tires, brakes, and drive-line components.*

This Dart Model 140 mining truck (below) climbs 15% grades with 22-ton payloads *in one gear*—comes back down *without pedal-braking*—by utilizing up-to-6:1 Converter Drive and *built-in* Hydrodynamic Braking of Twin Disc Model CF Three-Stage Truck-Type Torque Converter (shown above in cutaway). Request Bulletin 501.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES OR SALES ENGINEERING OFFICES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA



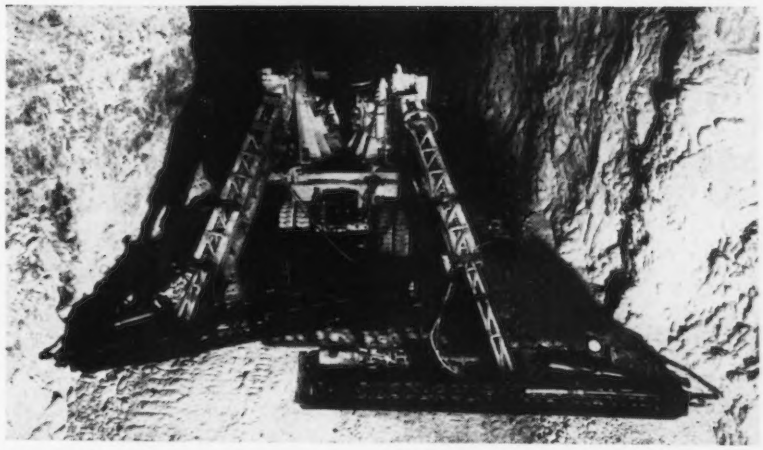
## Twin Disc built-in Hydrodynamic Braking

Today—in construction, mining, logging, and in the oilfields—users of heavy-duty off-highway trucks are gaining distinct advantages from Twin Disc Truck-Type Torque Converters, designed for specific operating conditions.

The Model CF Torque Converter (above) provides *automatically-actuated* Hydrodynamic Braking and Converter Drive—controlled by depressing or letting up on the accelerator—for operations involving constant climbing and descending of steep grades. The *built-in* braking feature incorporates a freewheel, which forces the truck's driving wheels to turn the impeller for a smoother, more powerful braking effort up to 70% of the engine's hp.

For operations combining steep grades with long, flat runs, Twin Disc provides the Model DF Torque Converter, with *Fingertip-Controlled* Hydrodynamic Braking, Converter Drive, and Lock-Out Drive for maximum speed and economy.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
TWIN DISC

**ELECTRIC ROTARY DRILL** carriage, in use at the anhydrite mine of Imperial Chemical Industries, Billingham, England, is said to be revolutionary in British mining. The two drills can be used for simultaneous drilling in opposite rock faces. A quiet, dust-free operation is claimed. The chassis and electric drilling equipment weigh about 19 tons. Each jib is mounted on a turntable and is telescopic. A one-man, press-button panel controls the jibs.

# Peru Will Sell Uranium Ores and Concentrates to U.S. Government

AT A PRESS CONFERENCE held on Oct. 5 at the offices of the Peruvian Board of Control of Radioactive Substances, Lima, Col. Jorge Sarmiento, president of the board, announced that an agreement had been signed Aug. 19 in Washington and Sept. 14 in Lima with the U. S. Atomic Energy Commission for the sale of ores and concentrates of uranium oxide produced in Peru. The text of the agreement has not been made public. Colonel Sarmiento stated that this is the first contract of this nature to be signed with a Latin American country.

By Law No. 12004 passed by Congress and promulgated by the Executive last year, private industry was authorized to develop and mine uranium and other radioactive substances in Peru under State control and with the sale of all production directly to the State. To handle these transactions the Board of Control of Radioactive Substances, responsible directly to the President of Peru, was established on Feb. 25, 1954. The Board was authorized to draw up the requisite regulations and fix a scale of guaranteed and remunerative prices for the ores or substances sold to the Government for final disposal, this legislation being similar to that now in force in the U. S., Canada, Australia and other countries. The scale of prices per dry ton now announced is as follows:

| Per cent $U_3O_8$ Content | Basic Price | Bonus | Treatment Charge | Net Price |
|---|---|---|---|---|
| | US$ | US$ | US$ | US$ |
| 0.50 | 38.50 | 13.75 | 15.00 | 37.25 |
| 0.75 | 57.75 | 20.62 | 15.00 | 63.37 |
| 1.00 | 77.00 | 27.50 | 15.00 | 89.50 |
| 1.50 | 115.50 | 41.25 | 15.00 | 141.75 |
| 2.00 | 154.00 | 55.00 | 15.00 | 194.00 |

Basic price: US $7.70 per kilogram of uranium oxide ($U_3O_8$).

Bonus: US $2.75 per kilogram of $U_3O_8$.

While there is no official confirmation of the existence of uranium ore in Peru in commercial quantities and so far no shipments have been made, other than samples, AEC geologists, working in collaboration with Peruvian geologists, have been carrying on research work for more than a year in all parts of the country and newspaper reports of uranium discoveries are of common occurrence. Mr. R. R. Beard, geologist with the Raw Materials Division of the AEC arrived in Lima early last August and is now in charge of the exploration program for uranium and radioactive minerals which is being carried out under operating agreements with Peru and several other countries.

In speaking of the new agreement with the AEC and the operations of the Board

*(Continued on next page)*

## Mining Calendar

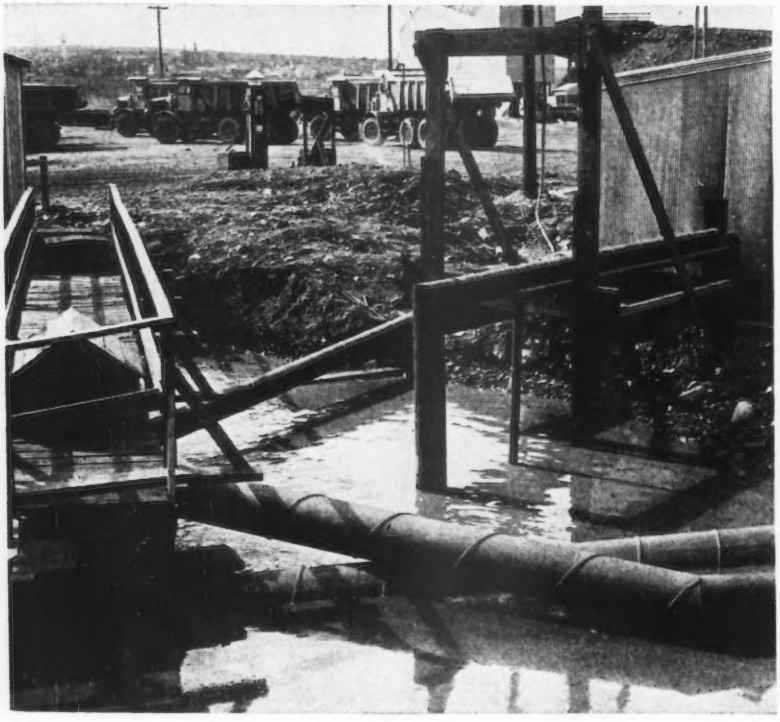
**Society of Exploration Geophysicists,** 8th Annual Midwestern Meeting, Nov. 18-19, Adolphus Hotel, Dallas.

**National Western Mining Meeting and Annual Meeting, Colorado Mining Association,** Feb. 3-5, Denver.

**AIME, Annual Meeting,** Feb. 14-17, Hotel Conrad Hilton, Chicago.

**Ninth Western Metal Congress & Exposition,** Mar. 28-April 1, Pan-Pacific Auditorium, Los Angeles.

# TRIM WASTE LINES



When it comes to getting rid of waste in mining, you can depend on light-weight Naylor pipe to do the job. It's easy to handle and install. And with Naylor, it's a simple matter to run lines wherever they're needed, particularly with the Naylor Wedge-Lock coupling that makes for the fastest possible connections, especially where space is limited. For sludge and tailings, air or water, you'll do better with Naylor pipe. Write for Bulletins No. 507 and No. 513.

NAYLOR PIPE

**Naylor Pipe Company • 1243 East 92nd Street, Chicago 19, Illinois**
**Eastern U.S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York**


of Control of Radioactive Substances, Col. Sarmiento stated that the agreement, in addition to fixing the prices for uranium ores with bonuses and the maximum and minimum quantities which might be purchased also provided for installations that may be made in Peru for the more efficient treatment of the ores, including concentration plants where low grade ores are found in large quantities. The Control Board will not only pay the net prices for the ore at the mine mouth but will also pay all additional charges for handling and transport of the same, including the commissions collectible by the Mining Bank.

Up to the present the Control Board has held 17 meetings mainly concerned with the drafting of the AEC agreement and the Regulations of the Board. It has acquired 20 geiger counters and 50 more have been shipped which will be sold to miners and prospectors at the prices in effect in the United States. Two pamphlets issued by the U. S. Government, "Prospecting for Uranium" and "Geology of Uranium" have been translated into Spanish and published and are being distributed gratis to national mining institutions and those interested in prospecting for uranium.

## Electromet Lets Contracts for Titanium Sponge Plant

ELECTRO-METALLURGICAL CO., a division of Union Carbide & Carbon Corp., has awarded design and engineering contracts for its $31.5-million titanium sponge plant to the Catalytic Construction Co. of Philadelphia.

The plant is to produce 7,500 tons of titanium sponge when it is at maximum capacity in 1956. The metal will be produced by sodium reduction of titanium tetrachloride, a new method developed by Electromet.

# IN THE U.S.

## ALASKA

**U. S. Tin Corp. mine at Lost River, Seward Peninsula, has made another shipment of tin concentrates.** The shipment which amounted to approximately 120 tons, was picked up by the last boat of the season.

**B. C. Mica Company of Vancouver, B.C., has been engaged in exploratory work on the Sitklan Island mica deposits** most of the summer. Sitklan Island is south of Ketchikan. The original holder of the claims is Frank Blasher of Hyder.

**Increased claim staking activity** in Alaska for the past field season has indicated interest in the following minerals and metals in order of their importance: iron, copper, gold, mica, sulphur (pyrites), mercury, molybdenum, nickel, limestone, uranium, and asbestos.

**Big Hurrah gold quartz mine, northeast of Nome, has had to close down.** After much rehabilitation work which led up almost to the point of actual production, serious ground movement and caving in the shaft forced a closedown of operations. It is reported that another attempt at reopening will be made next spring. The mine is a famous old producer of the early 1900's.

**Bureau of Mines reports that the DeCoursey Mountain Mining Co.'s Red Devil Mine is now the leading American mercury producer.** The property is on the Lower Kuskokwim River.

## ARIZONA

**Evidence of the uranium-fever that has hit northern Arizona** is the list of recordings in Gila County for the first eight months of 1954—a total of 3618 as compared with 458 for the same period a year ago.

Most of the filings were for uranium claims. High was reached in August when 974 claims were filed. Developers in the County are handicapped somewhat by lack of a marketing center. Predictions are that the AEC will soon authorize a buying station somewhere in the Globe area.

**New copper and molybdenum reserves are being sought in Santa Cruz County** in the Santa Rita Mountains District. Work is being done by Wright Associates of Phoenix under contract with holders of 33 claims comprising the Old Hickory Copper Co.

Drilling is to locate suspected rich veins of copper. The historic district first was mined by the Spaniards more than 400 yr ago.

**New hours for the Wenden Manganese Depot are 7 am to 7 pm, Monday through Friday.** Previously deliveries were not accepted before 11 am. At the present rate of 3000 tons of ore a week, averaging about 29.8% manganese, the depot will reach its allotment of 6-million long tons by mid-January. Unless an increase is made in the Depot's quota, 50 Arizona mines employing 1000 workers in Yuma, Mohave, Yavapai, and Maricopa Counties will be affected.

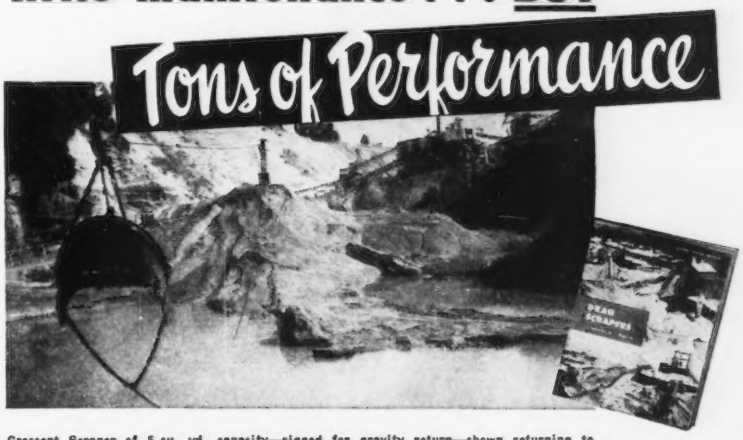
**Ray Mines Division of Kennecott Copper Corp. has won a National Safety Council award** of merit for 1953. The division experienced no fatalities during 1953 with 2,591,232 man hours worked.

**Magma Copper Co. at Superior has granted wage increases** ranging from 4½c to 10c an hour retroactive to July 11. The rates are in line with increases granted in other contracts signed recently by unionized companies.

## CALIFORNIA

**Miracle Mining Co. has sold its uranium property at Miracle Hot Springs,** Kern County, to Wyoming Gulf Sulphur Co.,


**Moderate cost . . . light on labor little maintenance . . . BUT**




Crescent Scraper of 5-cu. yd. capacity—rigged for gravity return—shown returning to excavation point in the pit. Ask for Catalog A and Field Report 214.

# SAUERMAN EQUIPMENT

Check on digging power . . . rate of haul . . . clean dumping. Add labor economy . . . low upkeep . . . personnel safety . . . moderate power consumption. Total up the score . . . you'll choose one of these Sauerman Machines for your operation.

Slackline cableway performs difficult excavation of non-caving material from wet pit. 70% rock and 30% colloidal sand posed tough digging job. Ask for Catalog C and Field Report 216.

DRAG SCRAPER: *best* for pit or hill excavation, reclamation or general handling of materials, wet or dry. Serves as rapid, long range conveyor. Sizes ⅓ to 15 cu. yds.

SLACKLINE CABLEWAY: *best* for deep digging — especially underwater — and conveying to a high delivery point. Reaches down a hundred feet or more . . . spans up to 1000 ft. . . . sizes ⅓ to 3½ cu. yds.

DRAG SCRAPER STOCKPILER: *best* for profitable handling of sand and gravel, ores and chemicals. Low on first cost, plus economical one-man operation.

Two small scrapers reclaim different sizes of crushed stone from adjoining piles to belt conveyors delivering to a common hopper used to load cars with straight or mixed sizes. Ask for Catalog E.

CRESCENT SCRAPER ON BOOM MACHINE: *best* for increasing the work capacity of any boom machine on backfilling and grading jobs. When scraper is used with track cable and trolley, machine range is greatly extended.

Crescent on boom machine dumps large load of wet peat. Bucket is gravity-returned on track cable to digging point. Ask for Catalog J-1 and Field Report 219.

Call on Sauerman's *experienced* engineers for the size and type system *best* suited to your digging, hauling or materials handling requirements. Write for catalogs . . . ask for idea-packed Sauerman News.

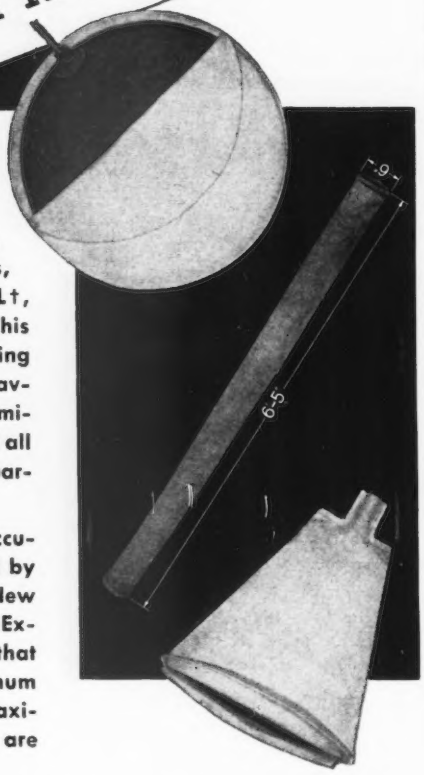
ONE MAN MATERIALS HANDLING

**SAUERMAN BROS., INC.**

584 S. Clinton St., Chicago 7, Ill.

- Vacuum and Pressure Filter Element Covers
- Dust Collector Tubes, Bags and Envelopes
- Anode Bags

Let US make up your Element Coverings from NFM Filter Media




**NFM** Filter Media are woven from Nylon, ORLON*, VINYON N**, Saran, Glass, Dynel, Cotton, VINCELt, DACRONtt, and TEFLON***. This wide range insures your obtaining the type of element covering having the greatest degree of chemical resistance and best general all round performance for your particular operation.

NFM element coverings are accurately and durably fabricated by skilled personnel at both our New Haven and Salt Lake plants. Experience has demonstrated that filter cloth costs are at a minimum and filter performance at a maximum wherever NFM products are employed.

**If you are not absolutely certain as to which type of synthetic or natural fiber is best for your use, send us a complete description of your operating conditions and we'll be glad to make a recommendation. Our many years of experience mean that we have quite a fund of knowledge at your disposal.**

* TM for Du Pont acrylic fiber
** TM—Union Carbide & Chemical Co.
*** TM for Du Pont Tetrafluorethylene Fiber
† TM—NFM Reg. U.S. Pat. Off.
†† TM for Du Pont Polyester Fiber

*Weavers of Industrial Filter Media for over Forty Years*

NFM The National Filter Media Corp.

General Offices & Mills: New Haven 14, Conn.
Western Office & Factory: Salt Lake City 1, Utah

Sales Offices—Representatives

| Chicago, Ill. | Cincinnati, Ohio | Houston, Texas | Oslo, Norway | Johannesburg, South Africa |
|---|---|---|---|---|
| 2627 West 19th St. | Roselawn Center Bldg. | 1503 Hadley Street | Nicolai Friis | Edward L. Bateman |


## California *(Continued)*

Cody, Wyo. Price was reported to be $30,000 plus royalties until $1-million is paid.

Development done by Miracle Mining consists of trenching 500 ft vertically above the tunnel and 900 ft horizontally. Two adits—one 250 ft long and the other 20 ft—were dug, but there are no stopes.

The State division of mines reports the property contains irregular occurrences of autunite and torbenite located in a shear zone in granitic rocks. No gangue minerals are present, and the occurrence is not a contact zone, division officials said.

The mine is located 1½ mi west of Miracle Hot Springs near the Kern River. U. S. Geological Survey has tentative plans to map the area in cooperation with AEC.

A number of claims along the shear zone were staked by H. B. Mann, president of Miracle Mining, and the northern extent of the shear zone has been staked by E. W. Sawyer, Sawyer Exploration Co.

**Cordero Mining Co. has obtained a 10-yr lease on Bradley Mining Co.'s** Reed Mine in Lake County. Reed produced 250-300 flasks of mercury a month before it was shut down. The arrangement with Cordero reportedly does not include an option to buy the property.

**Dramatic discovery of water on the desert** may give new life to the California Rand according to Philip M. King, Sr., president of Lila King Mining Co., located in a sheelite area of Kern County. MacAfee and Co., Los Angeles directed the water operation which found "clear, good water" in the Harper Fault, near Randsburg.

Full time tungsten production will begin soon, along with increased gold mining. "Now that water has been found in the Rand district," said King, "a rush for big-time tungsten mining is sure to follow." King noted the loss of tungsten sources in the Orient, due to Communist aggression and said the nation will be soon looking to southern California as a major source.

Present mining plan is to form lakes with the water from the wells and use dredges for extraction of the ore.

## COLORADO

**Consolidated Uranium Mines, Inc., has completed a $5-million deal** in which Consolidated takes over four independent uranium companies.

The independents are Colorado Uranium Mines, Inc.; Three States Uranium Corp.; Paradox Uranium Mining Corp.; and Mesa Uranium Corp. All were headquartered at Grand Junction.

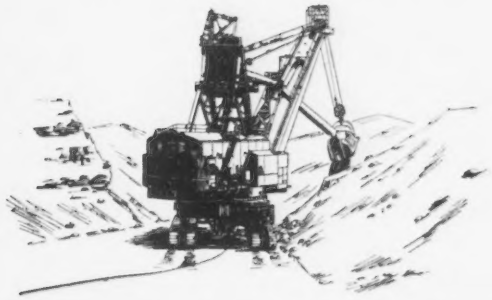
E. G. Frawley, president of Consolidated, said stockholders in the dissolved companies received Consolidated stock with a market value of $5-million.

Consolidated has been shipping more than 250 tons of uranium-vanadium ore daily from its operation in the Temple

Roebling Roeclad Type SH-D Trailing Cable is approved by the Pennsylvania Bureau of Mines Approval P-111, and complies with the requirements of the U. S. Bureau of Mines for flame-resistance. It is continuously mold marked for positive identification.

**For safety... maximum service life...**

# ROECLAD TYPE SH-D TRAILING CABLE



BUILT FOR heavy duty service on such equipment as shovels, draglines and dredges. This cable is designed to provide maximum protection for workmen and longest life on the job under the most arduous conditions.

## CONSTRUCTION

**Conductors** are tinned copper wire, rope stranded for extra flexibility.

**Insulation** over conductors is ozone and heat resistant, high voltage rubber compound.

**Cabling** — Multiple conductor cables are cabled together with rubber fillers (for greater flexibility, jute fillers may be specified).

**Reinforcing braid** is seine twine, for greater impact and tear resistance.

**Jacket** is made of thick Roebling Roeprene (neoprene), lead mold cured to give the cable firmness and compactness. The jacket is highly resistant to impact, abrasion, moisture, sun-cutting and deterioration from oil and chemicals.

If you want more information call your nearest Roebling office (listed below) or your Roebling distributor, or write to John A. Roebling's Sons Corporation, Trenton 2, N. J.

**ROEBLING** CF&I

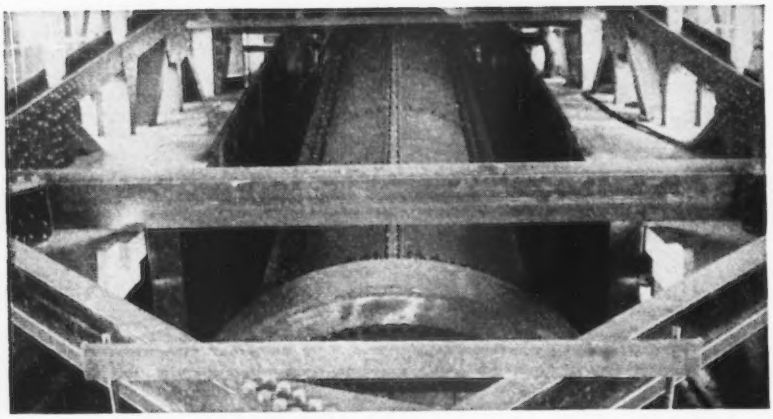
*Subsidiary of The Colorado Fuel and Iron Corporation*

BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HGTS. BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, ROOM 239, HENRY W. OLIVER BLDG. • ROCHESTER, 1 FLINT ST. • ST. LOUIS, 3001 DELMAR BLVD. • SALT LAKE CITY, 526 W. 8TH SOUTH ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

# Need Screens or Conveyors

## FOR DREDGE MINE OR PLANT?

**CONSULT YUBA**



ABOVE

**YUBA-built** revolving screen, 50′ long, 9′ diameter, weight about 65 tons.

AT LEFT

**YUBA-built** conveyor stacker for conveying rock tailings from revolving screen on YUBA placer dredge to rock piles astern. 44″ belt, 225′ long.

You get long wear, reduce shutdowns for replacement when separating, scrubbing or sizing with YUBA Screens. They're made from Abrasion Resisting Steel* plate, a high carbon, high manganese alloy steel with Brinnell hardness of 200 to 250. Taper drilled holes prevent clogging, can be small and closely spaced for screening monazite sands and other rare earths. Flat or revolving. All thicknesses from ¼" up; other dimensions as needed. Screens with cast manganese steel plates also can be furnished on request.

* United States Steel product

Conveying rock, sand and gravel has been part of YUBA's business ever since 1909. We've built hundreds of heavy-duty conveyors for use on dredges, in pits and at plants. Bring your conveyor problems to us for recommendations and estimates. No obligation. Wire, write or call TODAY.

**YUBA MANUFACTURING CO.**

Room 706, 351 California St., San Francisco 4, California, U. S. A.

AGENTS { SIME, DARBY & CO., LTD. · SINGAPORE, KUALA LUMPUR, PENANG.
SHAW DARBY & CO., LTD., 14 & 19 LEADENHALL ST., LONDON, E. C. 3.

CABLES: YUBAMAN, SAN FRANCISCO · SHAWDARBCO, LONDON

YUBA DREDGES PROVED DEPENDABILITY AROUND THE WORLD


## Colorado *(Continued)*

Mountain district in Utah. The company also has interests in copper and tungsten.

**A new ore procurement branch has been established by the AEC through** a reorganization of the mining division of the Grand Junction operations office.

Dr. Charles A. Rasor will head the ore procurement branch, which includes the access roads program. A leasing and development branch is directed by Robert H. Toole.

Elton A. Youngberg now is head of the mining division. Under him as divisional deputy director is John J. Curzon, who joined the AEC in September. Previously Curzon was manager of the copper-zinc properties of the Howe Sound Co. at Holden, Wash.

Another addition to the AEC's Grand Junction staff is John Wallace Barnes, formerly of Carlsbad, N.M. Barnes has joined the staff of the processing division.

**Montrose County holdings of the J. R. Simplot Co. of Boise, Idaho, have been sold** to Camoose Mines Ltd., of Canada in what was described as a "multi-million dollar deal."

The transaction includes all equipment and machinery in three operating mines and 375 uranium mining claims. Explorations have blocked out $2.5-million worth of high grade uranium.

**Joint purchase of the Gold Hill properties near Gunnison** from U. S. Tungsten Co. was announced by Flanders Mining Co. of Grand Junction and Whitaker-Bigelow & Co. of Denver.

An exploration program is underway. It includes re-opening of the Ida May shaft for possible recovery of both gold and tungsten.

**Dennis W. Viles of Durango, vice president of the Vanadium Corporation of America,** went to the hospital with a shattered knee cap, suffered in an auto accident near Gallup, N.M.

VCA has placed in operation the new ore roaster at its Durango plant, which with other improvements will increase the plant's capacity by 25%.

**A technical report stating it is possible to determine the size of uranium orebodies** by testing samples for trace metal composition was presented at the fall meeting of the Grand Junction Geological Society.

Papers on three aspects of the report were read by William L. Newman, A. T. Miesch, and E. M. Shoemaker, all of the U.S. Geological Survey.

Newman said the discovery may mean mining companies can determine if they have gotten all ore from a mine by chemical tests. After more work is done on the process, he said, it may be possible to determine the size of orebodies in new discoveries.

Dr. Charles A. Rasor, head of the AEC access road program on the Plateau, reported at the meeting that 902 mi of access roads were built in the fiscal year ended last July 1, at a cost of $5,711,130. Mileages by states included: Utah, 476; Colorado, 274; Arizona, 116;

# STURTEVANT ROTARY FINE CRUSHERS

## Crush or Granulate to Fine, Even Sizes without Excess Dust...

Cross section view illustrating the crushing action

These rugged crushers speed output of fines, cut reduction costs. Desired fineness is quickly obtained by regulating hand wheel. "Open-door" accessibility permits fast, easy cleaning. They crush fine . . . crush fast and do not clog. Available in output capacities from 1 to 30 tons-per-hour. Write for catalog.

**STURTEVANT MILL COMPANY**
101 CLAYTON STREET, BOSTON 22, MASSACHUSETTS
*Designers and Manufacturers of:* CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

**CLIP AND MAIL COUPON TODAY**

Sturtevant Mill Company
101 Clayton Street
Boston 22, Massachusetts

Gentlemen:
Please send me catalog describing your Rotary Fine Crushers. I am interested in crushing_____

*Name*_____

*Street*_____

*City & State*_____

*Firm*_____

# By keeping drifts open . . .

## "COMMERCIAL" STEEL SETS Reduce Costs in Block-caving Mining

Block-caving method of ore mining is more profitable when "Commercial" circular steel sets are installed in mine drifts because more continuous and more uniform draw of ore reduces mining costs. Circular steel sets provide support needed to keep the drifts open and serviceable long after timber sets would fail even in heavy ground.

The installation of "Commercial" steel sets is simpler and easier than standing timber; normal maintenance cost is less because minor repairs are reduced to a minimum. Costly shutdowns and delays are avoided; in fact, the entire operation is speeded up.

"Commercial" was first to produce circular steel sets. An established product for years again has found acceptance in another more recent application which has helped to reduce the hazards in block-caving mining.

Pounds of "Commercial" circular sets will increase the ore draw in tons.

THE COMMERCIAL SHEARING AND STAMPING COMPANY

YOUNGSTOWN 1, OHIO · CHICAGO, ILLINOIS · SALT LAKE CITY, UTAH

"COMMERCIAL"

"PRODUCTS PREFERRED BY CUSTOMER ACCEPTANCE"

"Commercial" engineers will gladly assist you; they have the experience and know how.

LINER PLATES · RIBS · SETS · LAGGING

LA-2

## Colorado *(Continued)*

New Mexico, 10; South Dakota, 25. In the present fiscal year, he said, 40 mi of access road will be built in Colorado, and 138 mi in Utah.

**Attention has shifted in Gunnison County to uranium.** The Los Ochos discovery and sale has touched off a lot of prospecting activity in the Cochetopa and other Gunnison county areas. Thornburg Uranium Co. already has Marvin L. Thompson and his crew bulldozing out roads and mucking and loading ore. The fourth large dump truck load of uranium was shipped out by Thornburg to Grand Junction.

The Los Ocho Mining Co. sold its uranium ground up Cochetopa Creek to Vance and Garth Thornburg of Grand Junction. Their purchase agreement calls for $100,000 cash down and 15% of the gross value on all radioactive ore mined from Los Ocho's 31 claims in the vicinity of the Irving Youman's ranch, according to Jack Morrison, spokesman for Los Ocho.

**Uranium ores from Wyoming are coming to Colorado mills for treatment.** T.S. Avy, field engineer for U.S. Vanadium Co. of Grand Junction announced that his firm is buying Fremont County and other central Wyoming uranium ores for shipment from Shoshoni to its Rifle, Colo., mill. It also was revealed that the company will pay the railroad freight from Shoshoni to its mill on all ore assaying 0.30% or more.

**There are many bright spots in Cripple Creek gold mining operations.** Front Range Mines, Inc., operating the Strong and adjacent mines expects gross shipments to pass the $400,000 mark for the fiscal year.

Average values from the 2100 stope amounted to $71.45 per ton and the 1900 stope averaged $49.31 per ton. Intensive development work on the 1700, 1900 and 2100-ft levels is planned for the coming year.

The company's 200-ton mill at Dumont is in operation on a custom basis at the present time. Negotiations are in progress for the acquisition or participation in one or two uranium operations. John Deerksen, Denver, is president.

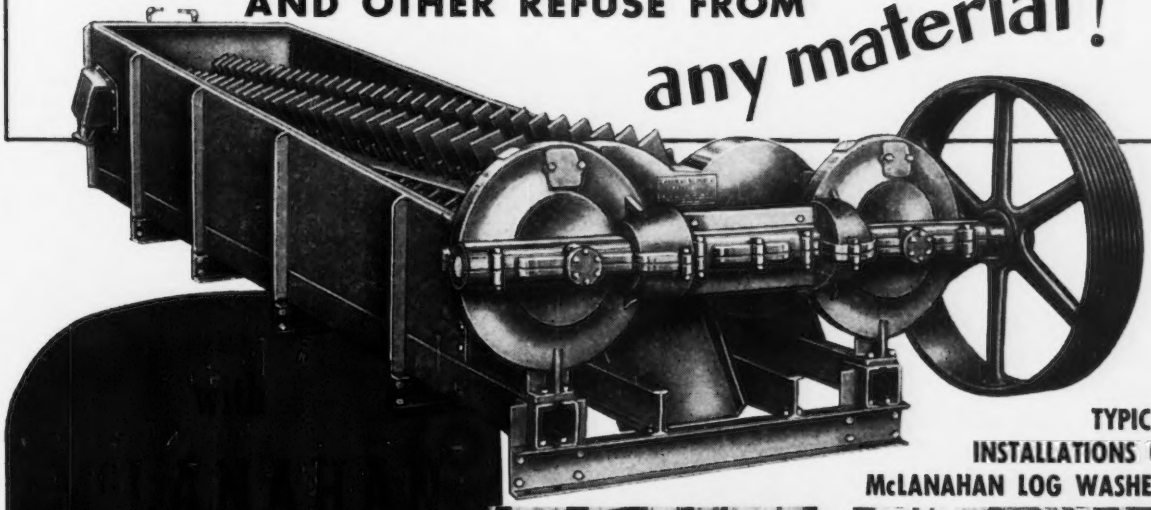
**Uncompahgre Uranium Co. Inc., Grand Junction, reports that negotiations were recently completed** for procurement of 39 uranium claims in the Moab district.

Exploration of this property will be undertaken in the near future. Another group of 14 claims also were added. This was by purchase agreement in the Uravan mineral belt on Calamity Mesa. Lease arrangements are underway for additional claims near Meeker and Idaho Springs. K. O. Weaver is vice president and general manager.

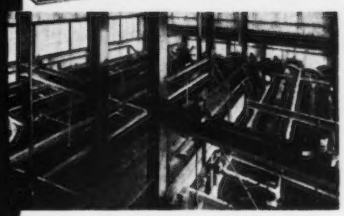
**Claim-staking in new areas of the Grand Junction District,** as well as continued activity in the established uranium districts, is going on at a heavy rate.

Now comes the report from Eagle County, that 68 claims were recently staked along the Colorado River in that high country. Bill Orgish of the McCoy,

# *Remove* TOUGH CLAY, SOFT ROCK AND OTHER REFUSE FROM any material!

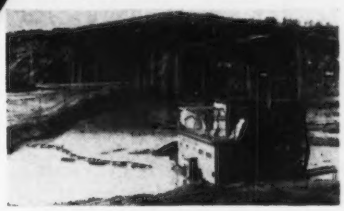


**TYPICAL INSTALLATIONS OF McLANAHAN LOG WASHERS**



Three pairs of McLanahan Logs in the world's largest phosphate plant in Florida.

New and old type McLanahan Log Washers used here remove clay from cement rock in Pennsylvania.



McLanahan Log Washers removing tough clays from gold ores in Alaska.

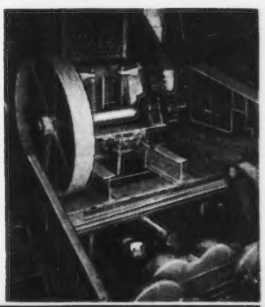
McLanahan Paddle Mill and Log Washer cleaning Texas limestone.

McLanahan Welded Steel Log Washers are smooth running, highly efficient machines for removing tough clays, soft rock and other materials from iron and manganese ores, barytes, zinc, ochre, peat, limestone, trap rock, sand and gravel, phosphate, gold and other ores. These machines remove up to 90% of refuse materials—providing savings that more than pay for the installation in a short time. A few of hundreds of applications are illustrated at right.

***Write today for Bulletin WLO 849***

Two pairs of 30' McLanahan Logs, used for cleaning sand and gravel in Virginia.

McLanahan Rockmaster Crusher and Log Washer removing tough clays from iron ore in Alabama.



**McLANAHAN & STONE CORPORATION**
*Pit, Mine and Quarry Equipment Headquarters*
**Hollidaysburg, Pennsylvania**

***Dependable Products:*** **Single and Double Roll—and Jaw Crushers, Crushing Plants, Reciprocating Plate and Apron Feeders, Roll Grizzlies, Conveyors, Elevators, Screens, Scrubbers, Steel Log Washers, Sand Drags, Hoists, Jigs, Dry Pans, Dryers, Scrap Bundlers, Pulleys, Gears, Bearings, Sprockets, Sheaves, Rollers, Bin Gates, Elevator Buckets, Gratings, Car Wheels, Ferrous and Bronze Castings.**

# Greater Footage at Lower Cost
## with
## Sprague & Henwood's ORIENTED Diamond Bits

**That's our story in a nut shell and we're proving it every day — not only in our own world-wide contract core drilling operations, but also through the money-saving results being achieved by hundreds of other satisfied users.**

**After extensive comparative tests had demonstrated to our satisfaction that drill diamonds cut much faster and last much longer when "oriented" in the matrix with their hardest edge or "vector" toward the work, we decided that random setting was both inefficient and wasteful. Since then we have standardized on oriented diamond bits and have produced THOUSANDS — in a wide variety of types and sizes; with both cast- and powdered-metal matrices.**

**Only selected diamonds of certain crystaline structure can be used and only specially trained and equipped setters of more than usual aptitude can be relied upon to orient diamonds correctly in the mold, but we are now fully organized for efficient production of ORIENTED DIAMOND BITS, at no additional cost to purchasers.**

**In terms of footage cost, these are the most economical diamond bits ever produced and we invite inquiries on that basis. Bulletin No. 320 illustrates and describes all types and gives complete data.**

**SPRAGUE & HENWOOD, INC. Scranton 2, Pa.**

BRANCH OFFICES: NEW YORK - PHILADELPHIA - PITTSBURGH - GRAND JUNCTION, COL. - BUCHANS, NEWFOUNDLAND
EXPORT REPRESENTATIVE: PHILIPS EXPORT CO., 100 E. 42nd ST., NEW YORK 17, N. Y.

## Colorado *(Continued)*

Eagle County district, reports that he made a strike of uranium which assayed .30%. The ore was found on 200 acres of land, 1 mi west of his ranch. Orgish said the uranium was found in fossils and ore in the Morrison formation on the anticline.

**Better roads will be built into the uranium mining areas.** The U.S. Bureau of Public Roads has notified the Colorado state highway engineer that more than $1.3-million would be made available for construction, in Montrose County.

Actual building of the roads will be contingent upon the state or county putting up additional funds. The money being made available by the Federal Government is part of a $2.5-million Atomic Energy Commission appropriation for road work in both Colorado and Utah. The amount of work planned in both states totals $3,501,950, thus requiring the states to put up nearly $1-million in matching funds.

**Uranium Producers Inc., John Deerksen, president, announces the completion of 12 mi of road** down the Dolores River Canyon to its uranium property which is said to contain one of the largest outcroppings in the Shinarump on the Colorado Plateau.

The camp site has been cleared, and the construction of houses for the miners has begun. Machinery and equipment, all new, is now being moved in.

**A new cinder-block mill building is a new development at the Boss Mine** on Rock Creek north of Dillon. The Boss mine is operated by Larry Spitzer and associates of Denver.

This famous old mine in the Gore Range was operated many years ago as a producer of high grade silver ore. More than 50,000 tons of dump rock is said to carry values in silver and other metals capable of profitable milling.

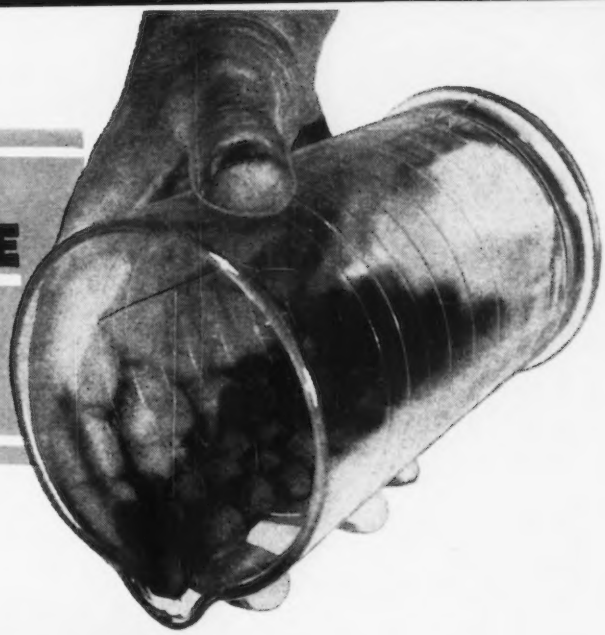
The new mill is being built in Denver and will be shipped to the mine for installation in the new building.

**Diamond drilling is underway on Farwell Mountain near Hahns Peak.** An 830 ft tunnel on the property recently was reopened by the Colorado Mining Corp. for copper and molybdenum. Machinery and equipment was hauled in and a $50,000 drilling program started. About eight miners already are employed in the exploration work.

The corporation, of which George Roberts of New York is president, has 34 patented claims in the area and expects to start shipping ore this fall. It is believed 20 to 30 tons of copper and molybdenum ore may be mined daily. **Another major uranium transaction was completed in Grand Junction** with sale of the entire assets of the Gateway Mining & Development Co. to Flanders Mining Co. Terms of the sale were $250,000 cash and $1-million from ore production payments.

Properties acquired by Flanders include about 150 claims on Beaver Creek west of Gateway. Full production bonus

# IT'S HIGH-GRADE ORE NOW



## New process makes pelletizing and heat-hardening of taconite concentrate practical

THESE hard, relatively uniform-size pellets, containing 60% to 65% iron, were produced from taconite in the first full-size (1000-plus tons per day) plant of its kind.

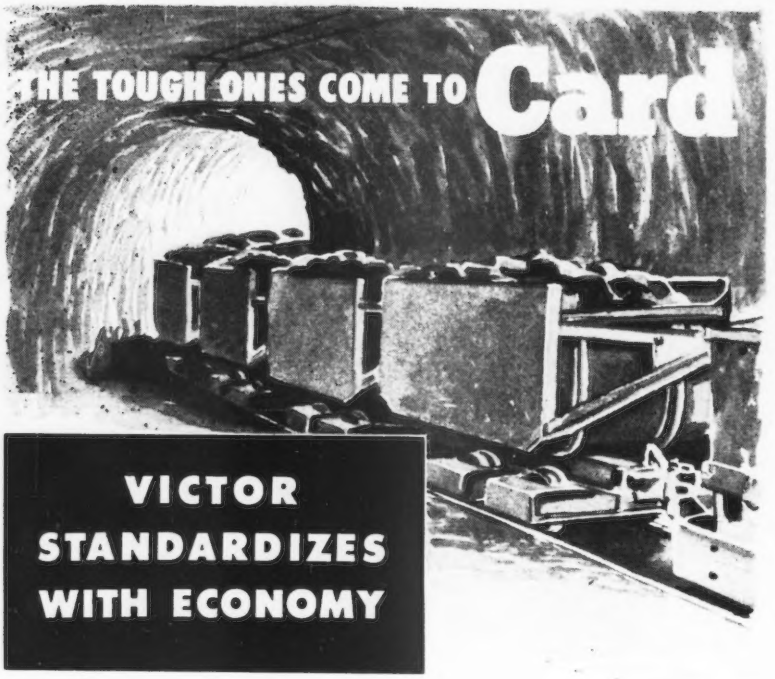
The new plant, designed by Arthur G. McKee & Company was built after a long period of experimental development and pilot-plant operation in which McKee engineers collaborated to perfect the process. A large-scale plant to produce 12,000 tons a day is now on McKee drawing boards.

Pellets produced by the new method withstand the rigors of shipping, handling and charging into the blast furnace. They provide an ideal burden which permits uniform flow of gases throughout the furnace. Accurate control of physical and metallurgical properties of the pellets is easily maintained and production is more efficient and more economical than by any other method of processing taconite concentrate.

We will be glad to supply you with complete information on the new process at your request.

**McKee Engineering Services**

**Arthur G. McKee & Company • Engineers and Contractors**
*Headquarters:* McKee Building • 2300 Chester Avenue • Cleveland 1, Ohio
*Offices:* New York • Tulsa, Oklahoma • Union, N. J. • Washington, D. C.
*British Representatives of Metals Division:* Head, Wrightson & Co., Limited
*Canada:* Arthur G. McKee & Company of Canada, Ltd., 372 Bay St., Toronto

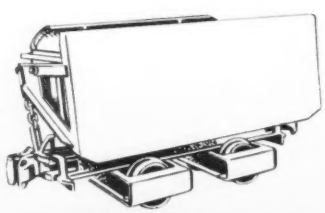



VICTOR STANDARDIZES WITH ECONOMY

The Maiden Rock Mine of Victor Chemical Works first started using Card cars in 1950. Chosen design was a Granby type car of 57 cu. ft. capacity built on 24" gauge and featuring coil spring suspension. The phosphate rock being handled is relatively clean to handle, and the car design is unusually well suited. As a result, not a single Card car has ever had any significant repairs although some wheels have been replaced. Fifty-two of these cars are now in service, representing several re-orders over a four-year period.

Much of the haulage at Maiden Rock is underground, and many of these Card cars seldom see the light of day. The steady day in, day out service record of the cars has meant high production with remarkable economy for Victor—one of the three largest producers of elemental phosphorus.

**Standardize your haulage with an economical Card design. Our engineers can furnish an efficient car to meet your most difficult specifications.**



C.S. Card Iron Works Co.
2501 WEST 16th AVE.,
DENVER, COLORADO

## Colorado *(Continued)*

of $35,000 already has been taken on one mine by Gateway Mining.

Senior partner in the Flanders Mining Co. is Maj. Gen. Frederick L. Anderson, retired, of Atherton, Calif. Gen. Anderson headed the Eighth Bomber Command during World War II and later became deputy chief of air staff for the air force.

## HAWAII

**Feasibility of a titanium processing plant in the Islands** was affirmed by Dr. G. Donald Sherman, professor of agriculture at the University of Hawaii, after a conference with officials at the U.S. Bureau of Mines laboratories in Washington, D.C.

Sherman said Bureau of Mines tests show Hawaiian titanium deposits contain anatase, a popular base for white paint.

He said a 15-acre portion of some of the richer Kauai deposits could supply a plant with enough ore to refine 5000 tons of concentrate a year.

## IDAHO

**The lead-silver vein opened near the portal of the adit tunnel at the property of Idaho Goldfields Inc.,** in Fourth of July Canyon between Kellogg and Coeur d'Alene, has been proven to a depth of 35 ft in an exploratory shaft.

The vein averages about 3 ft in width, with a streak of good high-grade. Ore from the shaft development has been stockpiled for milling at a later date.

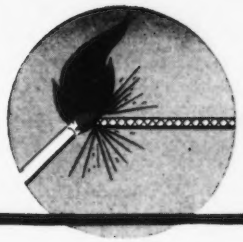
A. C. Milholland of Smelterville and Irvin Jewett of Pinehurst are operating the property under a leasing contract. They plan to start drifting on the vein soon.

**Mascot Mines, Inc., Pine Creek District operator, has acquired by outright purchase the 9-claim Alto group** of uranium claims in the Uravan mineral belt of southwestern Colorado, on the southerly portion of Beaver Mesa, Gateway Mining District, Mesa County.

Arrangements have been concluded with contract drillers at Grand Junction, Colo., to start an exploratory drilling program on 2 weeks notice. Geology of the area indicates that the favorable Salt Wash member of the Morrison formation, which has produced 90% of U. S. uranium output, will be found at comparatively shallow depth, ranging from 150 to 200 ft.

Meanwhile, the company's Little Pittsburg zinc-lead operation in the Pine Creek District of the Coeur d'Alenes, is being maintained in stand-by condition pending improvement in the prices of lead and zinc.

Sub-leasing operations have kept the mine and mill in readiness for immediate resumption of normal operations, and about two years' reserve of ore is blocked out and ready for mining. A substantial program of exploration and deeper de-



# LIGHT IT-*and walk away!*

## *Ignitacord will ignite every fuse in the round*

*Less hazard* and *greater efficiency* are two reasons why the new type IGNITACORD* is gaining favor for rotation firing.

1. The Blaster lights the Ignitacord at one point – and leaves the face. The Ignitacord can be ignited with safety fuse to obtain a longer delay if desired.

2. All fuses in the round are cut to uniform length. There is no need for trimming, since accurate time delay and proper rotation is governed by the length of Ignitacord used between holes.

IGNITACORD burns progressively at a uniform speed along its length with an external flame at the zone of burning. The flame is short and hot – acts like the flame of a Hot Wire Lighter.

Two types are available. Type A burns at approximately 8 to 10 seconds per foot. Type B burns at approximately 16 to 20 seconds per foot. Each type is packed on 100-foot spools with identifying label. Both types are color-marked at one-foot intervals, making it easy for the Blaster to connect the fuses at correct intervals.

IGNITACORD CONNECTORS provide the most efficient and convenient method of attaching Ignitacord to Safety Fuse. The Connector is a metal shell containing an ignition charge. The shell is slipped over the freshly cut end of the fuse and crimped. A slot near the opposite end receives the Ignitacord, which is held firmly in place when the top is pressed down against it. Ignitacord Connectors are supplied in packages of 100.

*Sold on the West Coast under the name of SPITTERCORD by the Coast Manufacturing and Supply Co., Livermore, California.

*See your Explosives Supplier or write to*

**THE ENSIGN-BICKFORD COMPANY**

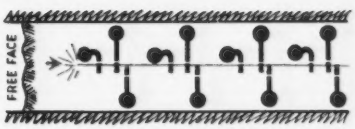
**SIMSBURY, CONNECTICUT**

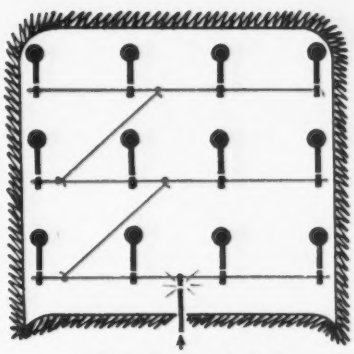
*Manufacturers of PRIMACORD® Detonating Fuse — and Safety Fuse since 1836*

IG-1

**IGNITACORD®**

**and CONNECTORS**

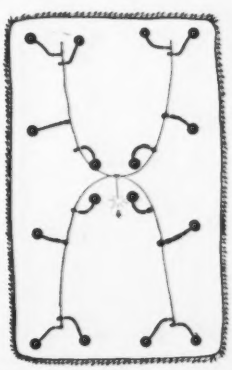


**FIRING STOPE ROUNDS**

*Fig. 1* shows a stope drilled with three rows of uppers, the fuse from each hole being connected to a single line of Ignitacord. Note that the center holes will fire before the two corresponding rib holes.

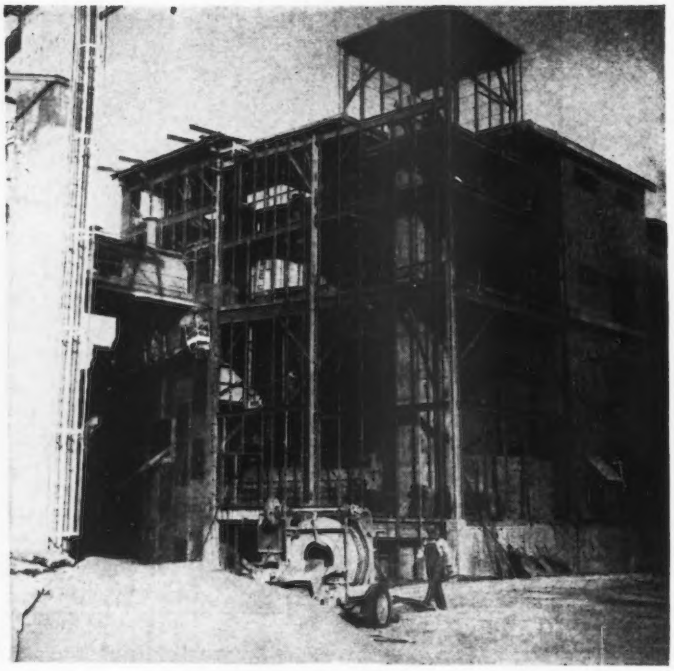
In *Fig. 2* the fuses extending from the horizontal breast holes are connected to four lines of Ignitacord at regularly spaced intervals. Jumper lines connect the horizontal lines, and the Igniter cord is activated by a length of Safety Fuse at Point A.



**FIRING DEVELOPMENT ROUNDS**

*Fig. 3* illustrates an Ignitacord hook-up arranged to fire the cut holes in one group, and the remaining holes in the proper order of rotation. Ignitacord lines should always be kept separated enough to avoid cross ignition.

# 110 ADDED BARRELS PER HOUR



Enlarging and modernizing the grinding room of this large cement plant provided a *gain in finished product* which far outweighed the costs involved.

Consult Stearns-Roger as to how to eliminate "bottlenecks" and increase both your plant production and efficiency.

Gunite...one of many modern types of wall construction employed by Stearns-Roger in buildings which house industrial plants.

**COMPLETE NEW PLANTS OR ADDITIONS TO EXISTING STRUCTURES**

***Undivided Responsibility***

- **ENGINEERING**
- **DESIGNING**
- **MANUFACTURING**
- **CONSTRUCTION**

**Stearns-Roger**

THE STEARNS-ROGER MFG. CO. DENVER COLORADO


## Idaho *(Continued)*

velopment has been outlined and will be carried out when market conditions warrant.

**Salmon River Scheelite Corp. this summer shipped 18 tons of 15% tungsten ore from open-pit operations** on its Custer County property on Thompson Creek above Clayton. Preparations for underground work which can be continued throughout the winter are now in progress. The ore was shipped to the Schmittroth and Etherton mill at the Big It Mine in the Coeur d'Alene District for up-grading.

**Mineral Hill Exploration Co. of Boise is investigating the possibility of an open-pit uranium mining operation** on 18 claims which the firm located in Elmore County, near Dixie. Bulldozers are being used to determine the quantity and quality of the uranium mineralization.

**Triumph Mining Co. has concluded a contract with the DMEA for a $143,354 lead-zinc exploration project** at its Triumph Mine near Hailey, in Blaine County. The two-year contract provides for underground crosscutting, drifting and raising, with the federal government bearing 50% of the cost.

**Primitive Exploration and Finding Co. of Hailey has stepped-up development work on its uranium prospect** near Richardson summit in Blaine County in the hope of getting into production before winter.

Some 40 ft of overburden have been removed at a favorable spot along the ore structure and a small shaft is now being sunk for a diamond drilling station. Samples of ore from the property have assayed as high as $147 a ton in fine-grained uraninite. Hardee Exploration Co., of Casper, Wyo., is carrying out the exploration program.

**Nabob Silver-Lead Co. and Merger Mines Corp. are reported to be considering a joint venture** in the Colorado plateau uranium fields. Directors of both companies have been discussing the area's possibilities and opportunities with a well-known engineer familiar with the region.

**Ione Mining Co. has blocked out about 3000 tons of lead-silver ore at its mine east of Murray** on the so-called "north side" of the Coeur d'Alene District, but low metal prices, together with lack of convenient milling facilities and a shortage of experienced miners, make it impossible for the company to extract the tonnage at a profit. About 160 tons, shipped to a custom mill near Wallace this summer, netted the company about $900 after hauling, milling and smelting charges.

**United Uranium Co., recently-organized Boise firm, has retained J. W. Melrose,** Spokane engineer of the firm of Frank Eichelberger & Associates, to make a thorough geological survey of its 1000-acre tract of state-leased land in the Rock Creek area of Blaine County preparatory to an extensive program of

# a tale of five miners...

Five miners with five Copco RH656-4W drills, working in a well-known mine under average conditions, were carefully cost-checked for record purposes. After drilling 225,766 feet it was found that the parts cost had worked out at only *half a cent a foot.* Another proof of Copco low cost operation.*

## YOU TOO CAN CUT COSTS, INCREASE PRODUCTION

# the copco way

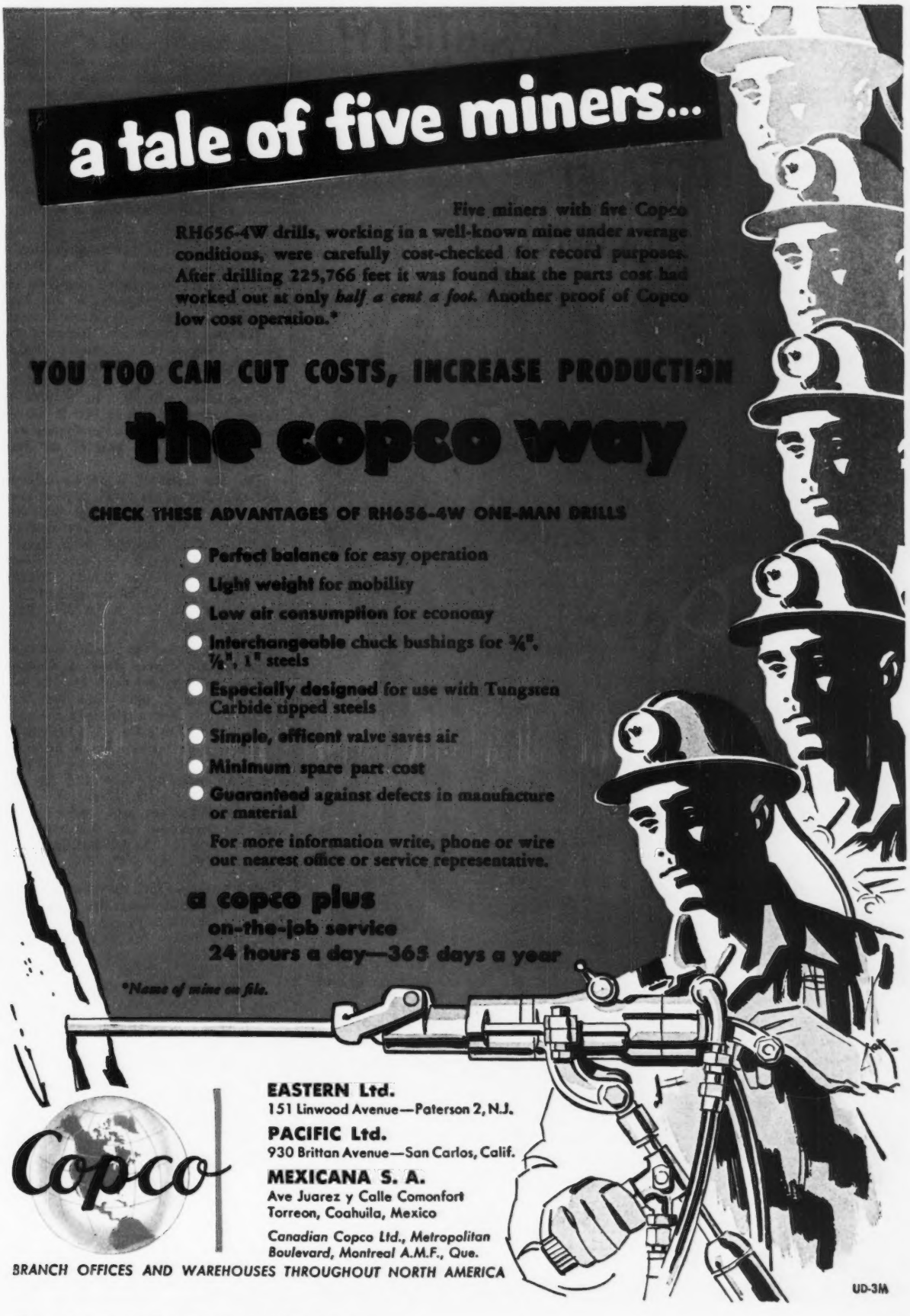
**CHECK THESE ADVANTAGES OF RH656-4W ONE-MAN DRILLS**

- **Perfect balance** for easy operation
- **Light weight** for mobility
- **Low air consumption** for economy
- **Interchangeable** chuck bushings for ¾", ⅞", 1" steels
- **Especially designed** for use with Tungsten Carbide tipped steels
- **Simple, efficent** valve saves air
- **Minimum** spare part cost
- **Guaranteed** against defects in manufacture or material

For more information write, phone or wire our nearest office or service representative.

**a copco plus**
**on-the-job service**
**24 hours a day—365 days a year**

**Name of mine on file.*



Copco

**EASTERN Ltd.**
151 Linwood Avenue—Paterson 2, N.J.

**PACIFIC Ltd.**
930 Brittan Avenue—San Carlos, Calif.

**MEXICANA S. A.**
Ave Juarez y Calle Comonfort
Torreon, Coahuila, Mexico

*Canadian Copco Ltd., Metropolitan Boulevard, Montreal A.M.F., Que.*

*BRANCH OFFICES AND WAREHOUSES THROUGHOUT NORTH AMERICA*

UD-3M

These are terms that JKS engineers are concerned with 24 hours a day in the design and manufacture of Diamond Drill Bits that suit your coring and drilling qualifications to a "T".

Throughout years of steady progress these standards were the basis for the drilling bits that are now recognized as unbeatable the world over.

**HARDHED matrix for non-abrasive formations**
**HARDHED 40 matrix for average drilling conditions**
**HARDHED 55 matrix for extremely abrasive formations**

When you next need a diamond drill bit which no formation will slow up, gives full core recovery, faster penetration *AND* saves you *days* and *dollars* in coring and drilling, contact your nearest J. K. Smit field representative or write us direct for literature and assistance.

SUPER MATERIAM IGNIS TRIUMPHANS Est 1888

**J. K. SMIT & SONS, INC.**
HOME OFFICE AND PLANT
MURRAY HILL NEW JERSEY

Additional plants in London, Paris, Amsterdam and Toronto, Canada

## Idaho *(Continued)*

exploration and development.

Preliminary examinations this summer indicate that the area is highly favorable for uranium mineralization, but whether or not it occurs in commercial quantities remains to be determined.

David Callender of Boise is president of the new firm; L. E. Clapp, chairman of the Idaho board of corrections, is vice president; and K. J. Roberts, northwest manager of Bond and Co., is secretary-treasurer.

**Sidney Mining Co. has been granted a new two-year contract by the DMEA for a $323,150 program of deep-level exploration** at its property in the Pine Creek area of the Coeur d'Alene District.

The project will involve deepening the main shaft from the 1700 to the 2300 ft level and carrying out about 4075 ft of drifting and 12,000 ft of diamond drilling on the lower horizon. Its purpose is to get beneath a 500 to 600 ft barren zone which, according to geological evidence, exists in that part of the Pine Creek area.

The new contract is an amendment and extension of the firm's original contract under which $200,290 was expended. It brings the Sidney contract total to $523,440, the third largest DMEA undertaking in the Coeur d'Alene District. Only Bunker Hill & Sullivan's Crescent project and Polaris Mining Co.'s East exploration, both in the Silver Belt, are larger.

**Bunker Hill & Sullivan Mining and Concentrating Co.'s iron plant at Kellogg, was destroyed by fire Sept. 20.** The loss was estimated at more than $200,000. The two-story frame structure, built in 1941, was used to process old tailings to recover iron for use as a flux in the firm's lead smelter. It also housed the ball mill for grinding tailings into sand for use in the pre-mix concrete plant.

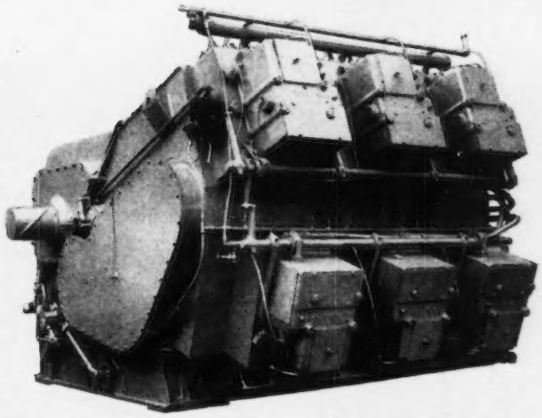
The plant had not been used for some time for processing flux, but workmen had been readying the ball-mill for a run of sand on the day of the fire.

**U. & I. Uranium Inc., operating firm for six Kellogg mining companies, is developing** what appears to be one of the major uranium orebodies thus far discovered in the Big Indian Wash area of San Juan County, Utah.

Ten out of the first 12 exploratory drill holes on the Radon group of claims penetrated the ore zone, indicating an orebody at least 1000 ft long by 150 ft wide, with the actual boundaries of the ore still undetermined. Trend of the zone appears to be northerly, and there are still some 1500 ft of ground to be tested before the north boundary of the property is reached.

Other major discoveries in the area include Homestake Mining Co.'s Little Beaver and Hudson properties, and the properties of Standard Uranium and Cal Uranium.

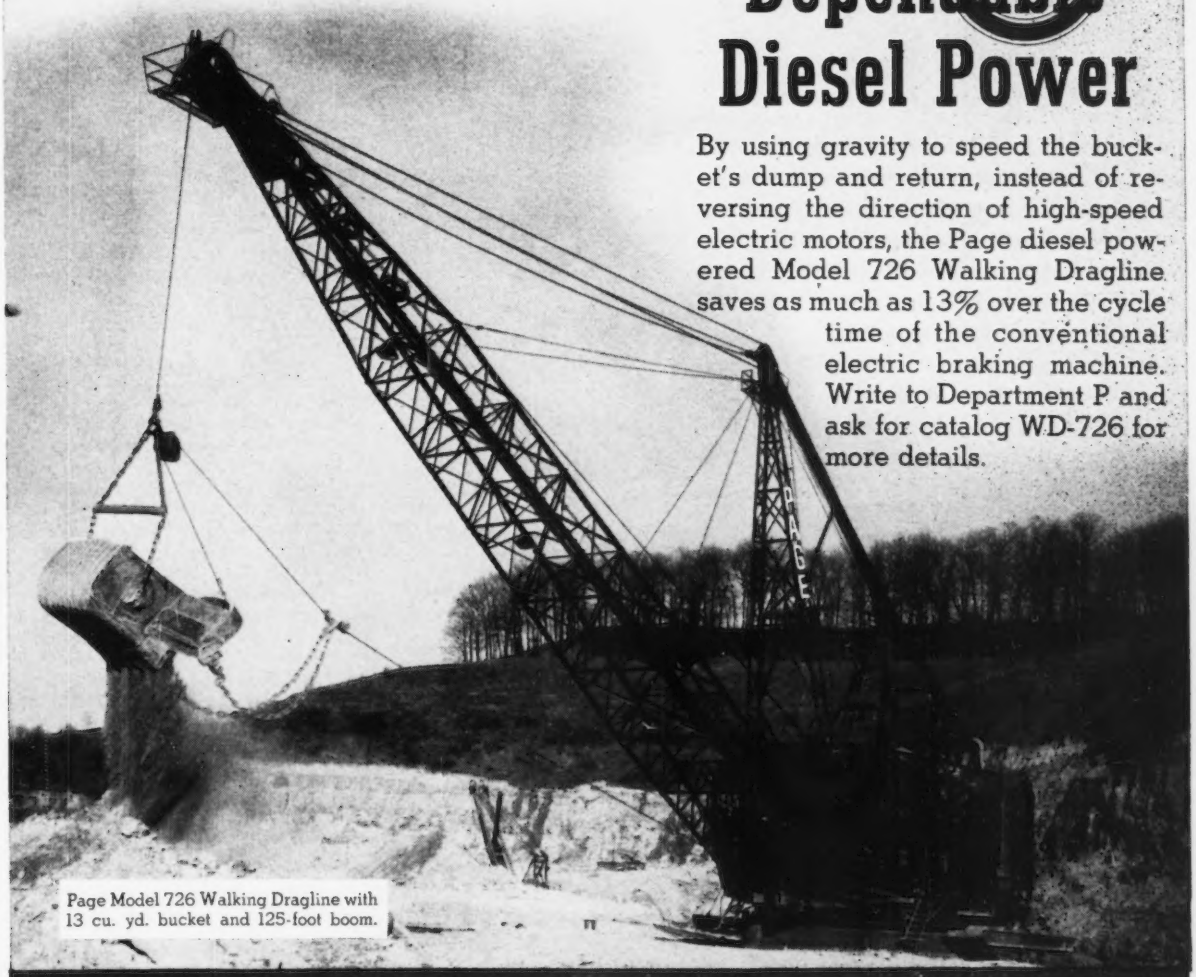
U. & I. Uranium is controlled by Caledonia Silver-Lead Mining Co., Coeur d'Alene Silver Giant Inc., Nancy Lee Mines Inc., New Era Mines Inc., Signal Mining Co., and Silver Bowl Inc.



Page Engineering Company custom builds the new V-type, Horizontal Diesel Engine, shown at left, in order to allow the use of larger, more economical, draglines of capacities up to 20 cu. yds. Like the time-tested Page inline diesel, the V-type takes advantage of medium speed, parts interchangeability and complete accessibility of all moving parts to insure economy of operation and low maintenance costs.

# Reduce Cycle Time with—Page Dependable Diesel Power

By using gravity to speed the bucket's dump and return, instead of reversing the direction of high-speed electric motors, the Page diesel powered Model 726 Walking Dragline saves as much as 13% over the cycle time of the conventional electric braking machine. Write to Department P and ask for catalog WD-726 for more details.



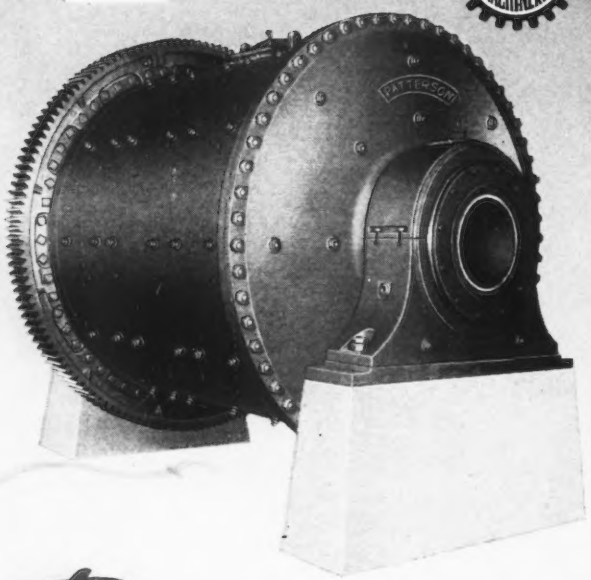
Page Model 726 Walking Dragline with 13 cu. yd. bucket and 125-foot boom.

**· PAGE ENGINEERING COMPANY ·**

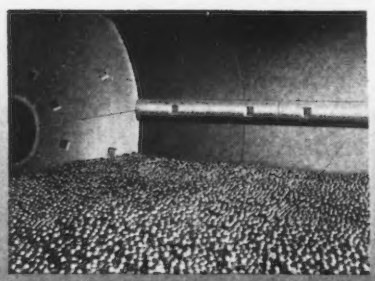
**CLEARING POST OFFICE CHICAGO 38, ILLINOIS**

HEAVY-DUTY GRINDING
from
Alumina
to
Zircon

SATISFACTION PATTERSON MACHINERY




Patterson
BALL & TUBE MILLS



BUILT TO WITHSTAND THE MOST SEVERE PUNISHMENT IN SERVICE—Readily adaptable to fine or coarse grinding, wet or dry grinding, open or closed circuit grinding. Used successfully by the metal mining industry throughout the world.

Do you have a copy of our Catalog 5347

The Patterson Foundry and Machine Company
East Liverpool, Ohio, U. S. A.
NEW YORK, BOSTON, BALTIMORE, PHILADELPHIA, PITTSBURGH, DETROIT, CINCINNATI, ATLANTA, CHICAGO, ST. LOUIS, HOUSTON, DENVER, LOS ANGELES, SAN FRANCISCO, SEATTLE
The Patterson Foundry and Machine Company, (Canada) Limited
Toronto, Canada
MONTREAL

## Idaho *(Continued)*

**Other Coeur d'Alene District mining firms are moving ahead with uranium exploration** and development projects in the Colorado Plateau area.

Western Silver-Lead Corp. and Square Deal Mining & Milling Co. have completed about half of their projected 10,000-ft drilling program on the jointly-leased Juanita group in the Yellow Cat area of Brand County, Utah. Three holes drilled on the Juanita No. 5 claim, drilled on 200-ft centers, have penetrated a mineral zone with values of about 0.15% uranium oxide at a depth of from 115 to 120 ft. The mineralization occurs in a favorable coarse-grained sandstone formation ranging from 35 to 60 ft in thickness. Further drilling on 100-ft centers is now in progress.

National Uranium Corp. has started exploratory drilling on the Lamm group of claims in the Big Indian Wash area of San Juan County, Utah. The Chinle formation, favorable uranium host rock, has been found at a depth of approximately 600 ft. National is carrying out the program of exploration under a profit-sharing agreement with Silver Buckle Mining Co., which holds the Lamm group under lease. Two other groups of claims in the same area will be explored by drilling under the same agreement.

Uranium Exploration Co. of Wallace has optioned the 8-claim Gracie group along the Lisbon fault in San Juan County and expects to start a drilling program as soon as funds are obtained through a public offering of company stock. The Gracie claims are strategically located, lying adjacent to the Old Texas Mine which Chicago interests bought recently for $4.5-million.

Hypotheek Mining Co.'s second test hole on a 10-claim property in the Coyote Wash area of San Juan County, Utah, encountered two narrow seams of uranium ore at depths of 428 ft and 432 ft. A third hole is now being put down.

Silver Buckle Mining Co. now has in progress a test drilling program on its Mountain Lion 18 and 19 claims, which are surrounded on three sides by Homestake Mining Co. holdings already tested by drilling. The work is being directed by Richard Teichman, consulting geologist and chief geologist for Cal Uranium Co. These claims are in the Big Indian Wash area.

## ILLINOIS-KENTUCKY

**Two fluorspar properties of Ozark-Mahoning Co.,** shut down for four months, reopened Oct. 4.

They are the Deardorff and the W. L. Davis No. 2, located in the Cave-in-Rock section of Hardin County, Ill.

Formerly operated under contract, the properties now will be operated directly by the company itself, according to company announcement of a change in policy. Ozark-Mahoning's Commodore mine in the Kentucky field continues operation.

**A new 800-ft shaft is being sunk for Ozark-Mahoning Co.** by J. W. Patton &

22-ton "Eucs" with quarry bodies haul stone for Ideal Cement Co. of Colorado. Top speed of this Model 36 TD, with full payload, is 32.5 m.p.h. Spring mounted drive axle and Allison Torqmatic Drive are important factors in stepping up production and profits at this operation.

# Higher Availability
# More Tonnage
# Lower Costs

On scores of mine and quarry operations all over the world the high job availability of Euclid equipment results in more tons hauled per shift. Because they're engineered and built for the toughest off-the-highway service, "Eucs" stay on the job longer, with less time out for servicing and repairs.

Dependable low cost hauling has made Euclid the preferred equipment for open pit operations in both the metallic and non-metallic mining fields. If you're interested in cutting your hauling cost for ore, overburden or waste, have your Euclid distributor prepare a production and cost estimate for your operation. There's a good chance he can show you how to haul more tonnage at lower cost.

**EUCLID DIVISION**
**GENERAL MOTORS CORPORATION**
**Cleveland 17, Ohio**

Rear-Dump models are available in 10, 15, 22, 34 and 50 ton capacities with engines of 165 to 600 h.p. . . . semi-rigid or spring mounted drive axles . . . standard transmissions or Allison Torqmatic Drives.

CABLE ADDRESS: YUKLID CODE: BENTLEY

# Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

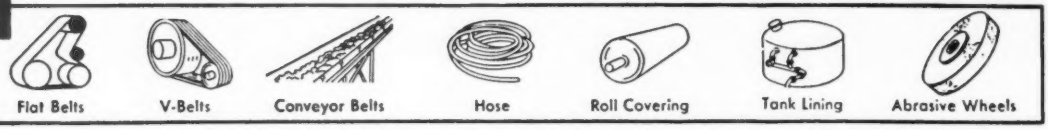
# *for every use . . . in every industry . . . more use per dollar*

**R/M HOSE** Raybestos-Manhattan makes Homoflex hose as flexible as a rope for handling air, water and for other uses. Workmen like it because it's light, easy to handle—yet strong. At the other extreme, R/M makes the world's largest and sturdiest hose for suction and dredging . . . and the world's safest hose for oil drilling, ship loading and other high pressure services. For every use, from ¼" paint spray to hose large enough for a man to crawl through, R/M's engineering and production are geared to give you "more use per dollar" from every length you buy.

You get more use per dollar too, in R/M transmission, conveyor and V-belts and other industrial rubber products. Consult an R/M representative.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

**RAYBESTOS-MANHATTAN, INC.**




Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

RM-413

## Illinois-Kentucky *(Continued)*

Sons, Elizabethtown contractors, on the Hill-Ledford fluorspar tract, 5 mi north of Cave-in-Rock. Concrete work has reached a depth of 40 ft.

**Ray Crabb, of Eichorn, Hardin County, former co-owner of Redd Mining Co.,** has leased 80 acres in the Karber's Ridge section of the County and has started exploratory drilling.

## MICHIGAN

**The Crystal Falls Corp., Peter Kiewit & Son, Inc., has suspended development and production operations** at the Fortune Lake open pit mine of Pickands, Mather & Co. until next spring.

The corporation has completed 3 yr of a 5-yr contract for P.M.&Co. Fifty men are affected by the shutdown. P.M. will continue pumping from the Fortune Lake shaft where future underground operations will be carried on.

**Warner Mine of North Range Mining Co., during the first week of September,** reduced operations from a five day working week to four days for an indefinite period. North Range's Book mine at Alpha continues on a five-day week.

**On Feb. 26, 1954, the first iron ore concentrates from the Lake Superior District's** first plant built to beneficiate Michigan's "jasper" was stockpiled at the Humbolt mine.

Ninety years earlier, in 1864, twenty years after ore was discovered on the Marquette Iron Range, a company was organized to explore for iron ore on the property near Humboldt.

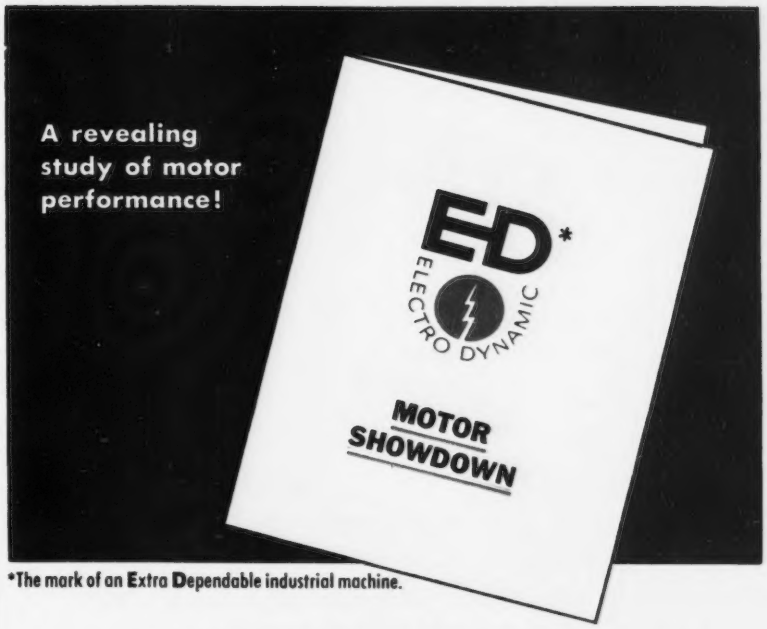
From 1865 to 1920, nearly 1½-million tons of high-grade ore was shipped from the property. It then lay idle until 1949 when the Cleveland-Cliffs Iron Co. began an 18-hole diamond drilling program to learn whether a sufficient tonnage of low-grade ore amenable to beneficiation could be located.

In 1951 the Humboldt Mining Co. was organized by the Cleveland-Cliffs Iron Co. and the Ford Motor Co. and in 1952 construction of the plant was begun. The operation is conducted by Cleveland-Cliffs. With overburden ranging from zero to 50 ft, stripping is not difficult. The present plant will handle 70 tons of crude ore per hour, which would produce about 250,000 tons of concentrates per year.

Because it is the first plant of its kind in Michigan, it is being followed with much interest by mining men and may be the prototype of many future plants.

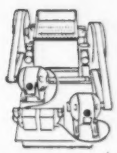
## MINNESOTA

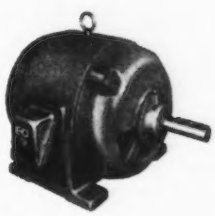
**Two bids for permits to "prospect" on 18,500 tons of lean ore in the Atkins Mine stockpile** at Kinney—one by E. W. Coons Co. of Hibbing and one by Skubic Bros. Co. of Virginia—were rejected on Sept. 15 by the Minnesota State Executive Council.


*The mark of an Extra Dependable industrial machine.

**THIS CANDID REPORT UPSETS MANY IDEAS ON MOTOR SELECTION FOR MINING MACHINES**





1 to 250 hp. AC and DC. Standard or special purpose. N.E.M.A. standards.

The results of comparative performance tests* on production line models of different makes of electric motors are reported concisely in a new booklet entitled **"MOTOR SHOWDOWN"**. The facts revealed are of real importance to anyone concerned with motor selection, because the makes of motors tested power over 75% of the electrically operated machinery in *your* industry. Mail the coupon below for your copy.

*Tests certified by J. Arthur Balmford, Professor of Electrical Engineering at a leading Eastern university

ELECTRO Extra DYNAMIC dependable motors

**ELECTRO DYNAMIC** • ***Division of General Dynamics Corporation***
**156 Avenue A, Bayonne, New Jersey**

Please send me a copy of "MOTOR SHOWDOWN" and the new catalog of Electro Dynamic industrial motors.

ED MOTOR SHOWDOWN

NAME_____

COMPANY_____

ADDRESS_____

## Minnesota *(Continued)*

High bid of Skubic Bros. was rejected because it did not fully comply with the law.

That of the E. W. Coons Co. was turned down on account of the wide spread between the two bids.

Bids will not be received again until August 1955. Nearly ¾-million tons of ore has been shipped from the Atkins with an estimated remaining tonnage of 90,000 tons.

**First iron ore concentrate from Oliver Iron Mining Division's new Plummer open pit mine beneficiation plant,** near Taconite, was shipped Sept. 13 after more than 2 yr of development and construction work.

R. T. Elstad, president of the Oliver Iron Mining Division, said: "This is another step forward in our long range program to conserve direct shipping ores by the utilization of low grade materials. It is Oliver's sixth plant engaged in this work and will be able to produce 1.2-million tons of iron ore concentrates annually."

The mine contains an estimated tonnage of about 5½-million tons. It will employ some 160 men. The mine was named in honor of the late Wm. H. Plummer, former general superintendent in the Canisteo District.

**Lloyd J. Severson, vice-president, Oliver Iron Mining Division in** charge of mineral development, told a meeting of the Society of Naval Architects and Engineers at Virginia, Sept. 17 that the shipments of high-grade iron ore from Minnesota will continue for many years despite the current accent on taconite developments.

"It is a safe assumption that it will be many years before Minnesota's high-grade ores are exhausted," he said.

He called the attention of the group to the fact that one-third of the ore now being shipped is concentrated low-grade ore and that present tax rolls still carry about 1-billion tons of ore as reserves.

**Shipments of iron ore from the Lake Superior area for 1954 are nearly** 27-million tons below those of 1953 for a corresponding date. Indications are that, when the final figures for 1954 are established, this differential will be considerably larger.

**M. A. Hanna Company's Fillmore County mines, in the Spring Valley area of southern Minnesota,** are about 27 mi south of Rochester. The ore deposits are small, ranging from 5 to 15 acres in size and are from 1 to 15 mi away from the plant site near Spring Valley.

Stripping overburden runs up to 35 ft and the ore deposits up to 25 ft in depth.

A total of 2,084,801 tons of ore has been shipped by the Hanna Co. since it took over in 1947, while 279,645 tons had been shipped previous to that year. The ore is shipped by rail to steel plants in Illinois.

**The safety record of the Mahoning Mine, operated by Pickands, Mather & Co.,** is unequaled by any other operation in the open pit division of nation-wide competition.

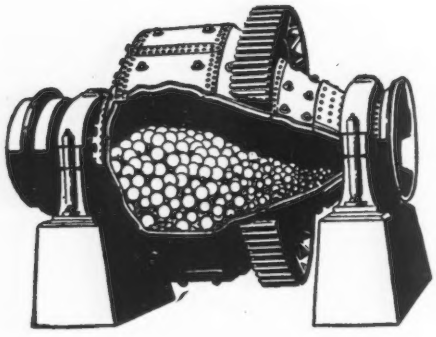
It has received the Sentinels of Safety trophy award eight times for the years 1931, 1938, 1940, 1941, 1942, 1945, 1947 and 1953.

It is a record of which P.M.&Co. and its safety department are justly proud. Clarence E. Hager is district safety supervisor and Wm. D. Webb is the Mahoning mine superintendent.

**Construction Aggregates Corp. of Chicago has launched the second hull for two new dredges** which will begin a 5-yr hydraulic dredging program to remove lake bed silt for the Caland Ore Co. (Inland Steel Co.) at its iron ore lease from Steep Rock Iron Mines, Ltd. This second dredge will be named the Joseph L. Block for Inland Steel Company's president.

**Rhude & Fryberger have begun stripping about 450,000 cu yd of overburden** at the Carlson-Nelson Reserve property on the Cuyuna Range, giving this range a new open pit mine.

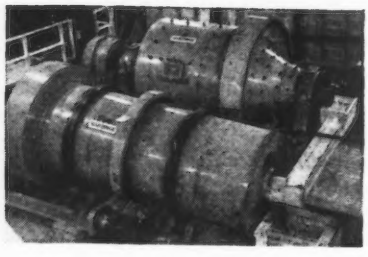
The property contains nearly 2½-million tons of marginal ore not assessed as iron ore. This is an example of the trend toward utilization of material—below the grade of straight wash ores

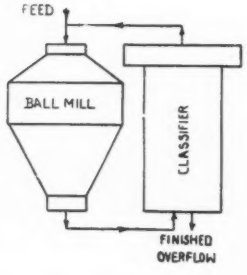



HARDINGE CONICAL MILL

in closed circuit with Counter-Current Classifier

IDEAL WET GRINDING TEAM






A mill feed up to 2" is possible with the closed circuit illustrated, but the more economical feed size is ½" or finer. Many other arrangements of Conical Mills and Counter-Current Classifiers are possible. Write for Bulletin AH-389-A1 "Wet Grinding with Hardinge Mills."

HARDINGE
COMPANY, INCORPORATED

YORK, PENNSYLVANIA · 240 Arch St. · Main Office and Works

New York · Toronto · Chicago · Hibbing · Houston · Salt Lake City · San Francisco

—and by one of the independent operators.

Another such example is that of the Charleson Iron Mining Co. plant at Virginia which successfully treats lean ore stockpile material from the Missabe Mountain and Minnewas mines.

**Five iron mining companies are active on the Cuyuna Range:** M. A. Hanna Co.; Pickands, Mather & Co.; Inland Steel Co.; Rhude & Fryberger and Zontelli Brothers Co.

## MONTANA

**Evidence of uranium mineralization has been detected by geiger counter** in the carbonaceous shale beds of the Philipsburg area, Granite County. Robert F. Little of Missoula and associates have staked 10 claims adjoining the Brooklyn Mine on the east and plan to make further investigations in the area.

The mineralization is said to be "spotty" but spread over a wide area. Samples of the radioactive ore have been sent to Washington, D. C., for analysis.

**Keystone Tungsten Mining Co., recently organized, has started development of a high-grade tungsten ore deposit,** assaying as high as 1½% tungsten content, west of Deer Lodge. The program outlined is designed to determine the size of the orebody and the type of mill to be installed, company officials state.

**Dumps of the old Gray Eagle and Comet Mines in the Basin Mining District of Jefferson County** have been found to contain a high degree of radioactivity. Geiger counters are being used to sort a shipment of uranium ore from the waste rock, and the Gray Eagle workings, closed by caving for many years, are being reopened to explore for the source of the radioactive ore.

## NEVADA

**High grade lead-gold-silver ore has been struck at the Grand Deposit Mining Co. property** in the Silver Mountain mining district of White Pine County.

The strike consists of an ore shoot up to 30 ft in width showing values up to 63% lead. Ore is estimated to run around $130 per ton. Discovery was made on the 180 ft level northwest of the main Grand Deposit shaft in virgin ground.

**Uranium Mines Inc. has 28 employees working at their Smokey Valley tungsten property** in Lander County. The shaft is now at the 170 ft level and is to be sunk 180 ft farther.

Water was encountered at the 132 ft level, but pumps were installed which easily took care of the problem. At present they are pumping 10 to 15 gpm. Work is progressing on the 200-ton mill at the site. A concrete retaining wall has been completed and machinery will be installed in the near future.

**Cucamunga Scheelite Corp. is mining tungsten on property leased from** Ira Miller and Eddie Shaw in the Cucamunga District of Esmeralda County.

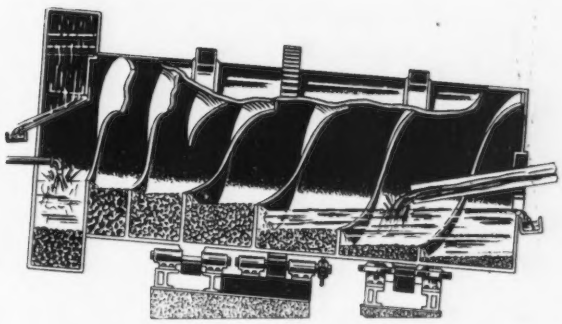
A tunnel is being driven, and an open pit is also being developed. Ore is being shipped to the Pinnacle Mining Co. at Bishop, Calif., and is showing good values.

The corporation purchased the mill and residence from the estate of the late John Dean and will convert the mill to the flotation process as soon as possible.

**Calumet & Hecla Mining Co. has purchased most of the mining equipment and material** from the Summit King property north of Tonopah, and has announced plans to carry on further exploration of the property when the project can be worked into their overall schedule of operations. Dr. Thomas M. Broderick is geological engineer representing Calumet & Hecla.

**General Services Administration is preparing a contract for a new titanium plant** to be constructed at Boulder City. M. G. Mastin is president of Aero Metals, Inc., which will erect the plant which is expected to cost approximately $3-million.

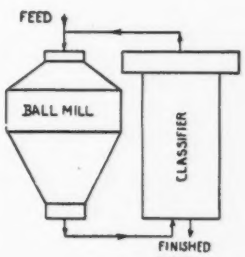
**Exploration drilling is now progressing at the Double O Timber and Mining**

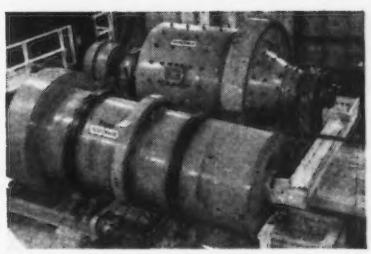



COUNTER-CURRENT CLASSIFIER

in closed circuit with Hardinge Conical Mill

IDEAL WET GRINDING TEAM



The Hardinge Counter-Classifier provides an effective classifying range of from 10 to 100 mesh. Will operate in closed circuit with a grinding mill without the use of conveyors or pumps. Can be supplemented by a Hardinge Hydro-Classifier for extremely fine products. Write for Bulletin 39-B-1 "Hardinge Classifiers and Heavy-media separators."

HARDINGE
COMPANY, INCORPORATED

YORK, PENNSYLVANIA · 240 Arch St. · Main Office and Works

New York · Toronto · Chicago · Hibbing · Houston · Salt Lake City · San Francisco

**E. A. GODOY & CO., INC.**
CUNARD BUILDING, 25 BROADWAY
NEW YORK 4, N. Y.

SALES AGENTS
REPRESENTING PRODUCERS OF

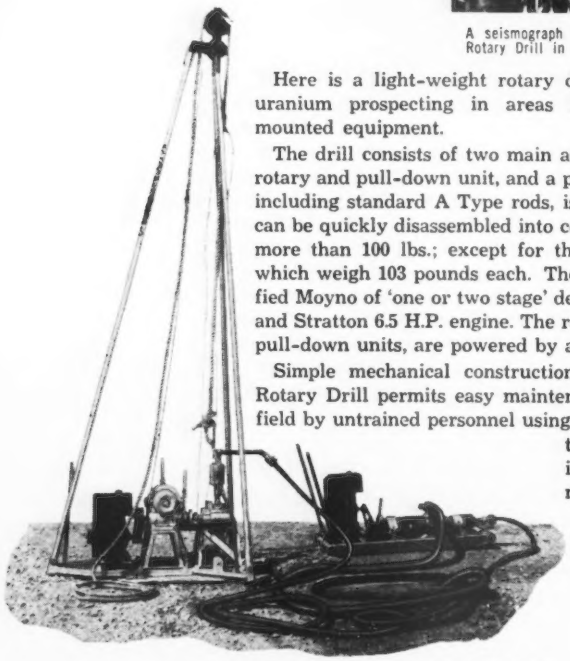
**CHROME ORES IRON ORES**
**MANGANESE ORES**



# A PORTABLE ROTARY DRILL for Uranium Prospecting*

*This drill has been thoroughly field proven for drilling shot and core holes and shallow water wells in remote areas of the world.

A seismograph crew using the A-3 Portable Rotary Drill in the jungles of South America



Here is a light-weight rotary drilling rig suitable for uranium prospecting in areas inaccessible to truck-mounted equipment.

The drill consists of two main assemblies — a combined rotary and pull-down unit, and a pump unit. Total weight, including standard A Type rods, is about 800 lbs. The rig can be quickly disassembled into components, weighing no more than 100 lbs.; except for the two gasoline engines which weigh 103 pounds each. The mud pump is a modified Moyno of 'one or two stage' design driven by a Briggs and Stratton 6.5 H.P. engine. The rotary table, cathead and pull-down units, are powered by a similar engine.

Simple mechanical construction of the A-3 Portable Rotary Drill permits easy maintenance and repair in the field by untrained personnel using no special tools. Where the use of such vehicles is practicable, the drill may be jeep - mounted.

WRITE TODAY FOR CATALOG SHEET, COMPLETE SPECIFICATIONS AND PRICES.

MANUFACTURED AND SOLD BY

***Seismograph Service Corporation***

P. O. BOX 1590

**TULSA 1, OKLAHOMA**


## Nevada *(Continued)*

**Co. uranium property** in the Kings River district 75 mi north of Winnemucca. Surface showings indicating strong radioactivity have been confirmed by engineers from the Atomic Energy Commission.

Principal officers of the company are L. W. Glessner, president; Albert S. Simrak, general manager, and M. E. Bohannon, of Reno, who is in charge of operations. Company offices are in San Francisco.

**Bulldozing, trenching and drilling operations are being carried out** by the Westvaco Co. at the Dacie Creek uranium fields in Humboldt County.

Assistance from County commissioners is being sought in building a road to the site. Ott Power is manager of the minerals development department of Westvaco, and is in charge of the project.

## NEW MEXICO

**Potash Company of America has contracted for the longest conveyor system in the United States** for use in a potash mine in Carlsbad.

The system, being designed and built by Hewitt-Robins Inc., will have a total length of about 7¼ mi. It is scheduled to be in operation in late 1955.

This "rubber railroad" is to operate 1000 ft underground in a potash ore seam about 4 ft thick. Continuous mining machines will extract the ore from the working face of the mine and deposit it onto shuttle-type conveyors. These conveyors will automatically transfer the ore by intermediate belts to the "mother" belts.

Over the main belt, the ore will be carried more than 5 mi to a 3000-ton underground storage pocket. From this pocket the ore will be withdrawn as needed by a special Hewitt-Robins rotary plow feeder and will be delivered to a vertical skip hoist by additional belt conveyors.

The rubber belt itself will be nearly 15 mi long since it will be doubled to provide for the return run.

## NORTH CAROLINA

**Mica purchases at the depot** established by GSA at Spruce Pine have totaled $3,468,722 during the first 24 months of operation.

Depot officials said that the rate of deliveries has increased considerably during the past several months. Purchases during June totaled $193,169; during July, $187,229; and during August, $165,627. This compares with a previous monthly average of less than $150,000.

More than 90% of the mica bought at the Spruce Pine depot is said to come from North Carolina mines, chiefly in the Spruce Pine Mineral District. The depot is understood to have bought more than 70% of all mica obtained by the Government under the stockpiling program. The rest has been purchased at Franklin, N. H., and Custer, S. D.

**Eastern North Carolina sub-section of the AIME** met at Raleigh, Oct. 2, with some 70 persons attending.

John V. Hamme, mill superintendent of the Tungsten Mining Corp., of Tungsten, presided as subsection chairman, and discussion centered around the newly-created Department of Mining Industries at N. C. State College. Speakers were Dr. J. H. Lampe, dean of the State College School of Engineering, and Dr. W. W. Austin, head of the Department of Mineral Industries.

## OREGON

**Chrome ore stockpiling which has stimulated chromite mining in Oregon-California** has extended to the Oregon coast black sands which were a principal domestic source during World War II.

Two companies are reported venturing capital in the activity which would center around Coquille and Coos-Curry beaches.

Pacific Northwest Alloys, Inc., Meade, Wash., subsidiary of Chromium Mining & Smelting Corp., Canada, has contracted with General Services Administration to upgrade chrome concentrates stockpiled since World War II near Coquille at the former metals reserve treatment plant.

The concentrates run about 40% $Cr_2O_3$ and will be made into low-carbon ferrochrome at Meade, running to about 48% chromium and 0.06% maximum carbon. The low-grade concentrates were mined during the war by the Humphreys Gold Dredging Corp. and Krome Corp. The sands were from ancient elevated terraces between Bandon and South Slough in Coos Co.

Second prospective operation involves lease of 4028 acres of Coos County land north of Bandon by John J. McCune, attorney, in the name of Mineral Sands Co., Lansing, Mich.

Correspondence with the Coos County Court has claimed possession of the "only successful upgrading process known" for processing the low grade chromite available in the tracts of black sand. Port of Bandon officials have confirmed the company has acquired use of property at the port.

## UTAH

**A new uranium ore-buying station was opened by the Atomic Energy Commission Oct. 1,** in the White Canyon area of southeastern Utah, 15 mi southeast of Hite.

Employing standard automatic sampling procedures, the new station's equipment includes primary and secondary jaw crushers, a set of rolls, and a third crushing unit, plus a sample grinder and pulverizer. Construction of the buying station was started in June by the Walker-Lybarger Construction Co.

The White Canyon station is being operated for the Commission by the American Smelting and Refining Co. Uranium ores delivered to the station are being purchased under the buying schedules in Domestic Uranium Program Circular 5, Revised.

Copper-uranium ores and high-lime ores are being purchased in accordance with the schedules for these ores now in effect at the buying station and processing mill at Monticello. Utah. The Commission also is interested in discussing arrangements for delivery to this station of types of uranium-bearing ores other than those described above.

Prior to the opening of the White Canyon buying station, ores produced by the uranium mines in this important area have been purchased by the Commission at Monticello.

**A "cat" on a road-building job on the shoulder of La Sal Mountain,** southeast of Moab, uncovered a surface outcrop of ore. One ore sample reportedly has assayed 47% uranium and 24% vanadium.

The "cat" was owned by Ace Turner of Moab, discoverer of the Vanadium Queen Mine in 1941 and more recently of the Gray Dawn properties. The surface outcrop indicates an orebody of considerable extent below the surface.

Turner's new discovery will be de-


DRILL LARGE DIAMETER HOLES THE MODERN WAY... WITH

SPANG FABRICATED STAR BITS

**Progressive Operators Everywhere Are Discovering This Modern, Better Way Of Drilling Large Diameter Holes.**

**SPANG FABRICATED STAR BITS** replace the conventional, old-style spudding bit and the big hole paddle-type bit. They are made in large diameters for drilling hard formations, and can be dressed, ready for drilling, by hard surfacing quickly and economically, thereby saving the time consumed heating and ramming. Made in a variety of diameters, lengths and weights, with any size joint desired, SPANG Fabricated STAR BITS are your assurance of profitable **big hole** drilling.

**For Extremely Large Diameter Holes SPANG PILOT-TYPE REAMER BITS ARE RECOMMENDED**

Field performance has amply proved these bits to be the driller's answer to **large hole** problems. They are made special, to your specifications and design, in any diameter; size and weight limited only by the handling capacity of conventional drilling rigs. They can be furnished to run on drilling stem or with integral rope socket top.

*For detailed information on SPANG Fabricated STAR BITS and SPANG PILOT-TYPE REAMER BITS for big hole drilling, plus 52 page CATALOG, consult your nearest SPANG DEALER or write direct to*

PILOT-TYPE REAMER BIT

SPANG & COMPANY

DEPT. M-2 BUTLER, PENNSYLVANIA

**For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Water Wells, Prospect Drilling and Shot Blast Holes.**

## Utah *(Continued)*

veloped by the Ace Turner Uranium Corp., formed as a wholly-owned subsidiary of American-LeDuc Petroleum Ltd., an independent Canadian oil company. The company has purchased about 110 claims from Turner and others, and Turner will be manager of production, exploration and development.

The claims are in the Brumley Ridge and Chess Ridge areas.

**United Park City Mines has reopened its lead-silver-zinc properties** in the Park City area of Summit County.

John Wallace, president, said the company expected to be producing 6500 tons of ore monthly within 60 days. The mines have been closed for almost 2 yr.

**Cornucopia Gold Mines of Spokane, Wash.,** has contracted for an exploration program on claims it has acquired in Wayne and Emery Counties.

**Four Corners Uranium Corp. reported six drilling rigs at work** on its Green River, Utah, and Bull Cañon, Colorado, uranium claims. Two sizable orebodies are being drilled, company president Eugene Sanders said. Four Corners also is operating mines in the Lion Creek area.

**Discovery of a uranium orebody on the Fault Claim** lease southeast of Moab was reported by the Kentucky Utah Mining Co. W. D. Nebeker, Jr., is president. The lease is in the Yellow Cat district.

**Pan-American Uranium Corp. has reported discovery of an orebody** in the Red Cañon area.

The strike was made on the opposite side of the mesa from the Happy Jack Mine. M. A. Makris, company spokesman, said ore was found "in a large body of Shinarump with high uranium content."

**A 235-ft shaft is being sunk by Sea Gull Uranium Corp.** on its claims in the Big Indian area southeast of Moab. Zeke Snyder, secretary-treasurer of Sea Gull, said $200,000 worth of ore had been blocked out on one claim.

**Contracts for 25,000 ft of non-core rotary drilling in** the San Rafael Desert and San Rafael Swell areas of Emery County are to be let by the AEC.

**Construction of a $500,000 mill at Sulphurdale is being planned** by the American Sulphur & Refining Co.

The company, a California concern, is leasing sulphur properties owned by George F. Kremm of Chicago. Drilling has disclosed reserves of 3-million tons of 25% sulphur-bearing conglomerate.

**Approximately 9300 acres of public land in the Calf Mesa area of Emery County,** which had been segregated by the AEC, has been returned to the public domain. No significant uranium deposits were found during exploration activities in the area, the AEC said.

**Notables from other fields entering the uranium business now include Gerald Gidwitz,** chairman of the Helene Curtis Industries of Chicago, a cosmetics firm.

Gidwitz is a principal figure in Continental Uranium, Inc., which now holds some 20,000 acres of uranium country in Colorado and Utah. Its most recent acquisition was the $4-million purchase of 26 claims in the Rattlesnake Mountain area, five miles northeast of the Charles Steen Mi Vida mine near Moab.

One of the company's mines, Continental No. 1 in the South Lisbon Valley, is shipping 2000 tons a mouth, and engineers say 75,000 tons of $60 ore has been blocked out.

## WASHINGTON

**Knob Hill Mines Inc., near Republic, has found ore on its new ninth level,** 1200 ft deep and 125 ft below previous workings. The mine has been the state's largest silver producer.

The orebody was reported as virtually the same grade as that worked on the eighth level, by A. R. Patterson, general superintendent. He forecast that the new ore would add several years to the life of the mine, "if lateral development proves good."

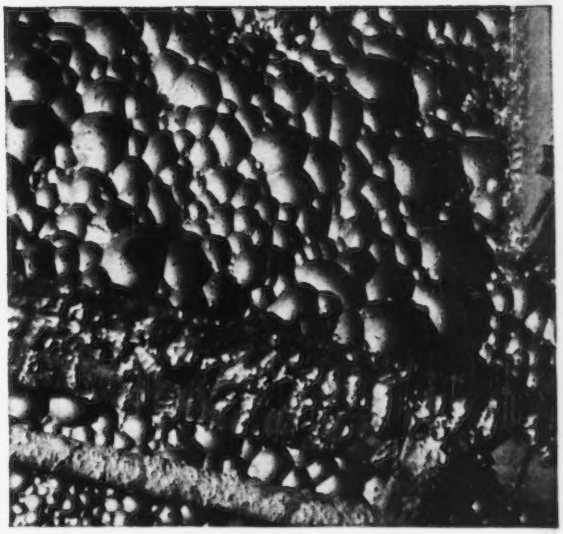
NEW
Vulcan-Denver
slusher hoists
• 15 to 75 h.p.
• double and triple drum
• rugged design . . . based on Vulcan's 20 years successful experience with large, heavy duty slushers.
WRITE OR CALL FOR COMPLETE DATA
VULCAN IRON WORKS COMPANY
1423 STOUT, DENVER, COLORADO
Vulcan-Denver

DOW

# DEPENDABLE DOW FLOTATION AGENTS

## bring you top pay load every time

**DOW XANTHATES, superior collectors, and DOWFROTH 250, economical frother, make a powerful team for improving your flotation of sulfide minerals**



DOW XANTHATES bring mineral recovery up and costs down in any mill operation. Every bubble is loaded to capacity with the desired mineral—a wide range of Xanthates makes a choice of selectivity possible: Z®-3, *Potassium Ethyl Xanthate*, is a low-cost reagent —popular as an all-purpose collector for many years.

Z-11, *Sodium Isopropyl Xanthate*, also a general-purpose Xanthate, is lower in cost and higher in collecting power than the ethyls. For this reason it is becoming more and more popular with operators for flotation and differential separation of substantially all sulfide minerals. Z-6, *Potassium Amyl Xanthate*, is a powerful collector for almost all sulfide minerals, particularly for tarnished and oxidized minerals—also for oxide lead minerals after sulfidization. Other Xanthates are also available for special problems.

DOWFROTH® 250 is an economical frother—producing improved metallurgy in many mills today, with as little as *one-fourth consumption of previous frothers used.* This translates into increased profits and substantial savings in all types of froth flotation operations.

Dowfroth produces a livelier froth on the machine, quicker breaking in the launders and pump boxes. Prove its efficiency—and its economy—in your own mill.

Send for test samples of Dowfroth 250 and Xanthates to Dept. OC-837H-1, THE DOW CHEMICAL COMPANY, Midland, Michigan.

*you can depend on* DOW CHEMICALS

DOW

## Washington *(Continued)*

The firm is producing 200 tons of silver-gold ore daily from levels other than the ninth.

**Alpine Uranium Corp. of Salt Lake City had ten men working this fall** at its holdings in the Turk copper mine and Deer Trail silver properties near Fruitland in Stevens County.

It was reported that $50,000 had been spent there in the last three weeks of August. Capacity at the Deer Trail was raised from 30 tons to 125 tons, according to J. W. Lower, manager.

New machinery has been installed, including a diesel electric power plant, crushing plant, new flotation cells and automatic controls. At the Turk, 2 mi of 3%-grade road has been built, old workings rehabilitated and buildings erected including an assay office and test laboratory.

Harvey Gray of Spokane has a contract for open pit mining at the Turk where bulldozing has opened ore 32 to 50 ft wide, assaying 3.6% copper and 5 oz of silver per ton.

Deer Trail tunnels are being opened and it is planned to mill 1000 tons by winter. Together with other claims Alpine is said to hold about 1000 acres in the district. According to a prospectus, Alpine Uranium has acquired a 25% interest in the Stevens County properties from Triumph Uranium & Oil Co. which is buying the title to the Deer Trail and a perpetual lease on the Turk from Three Peaks Mining Co. of Salt Lake City.

**Knob Hill Mines Inc., at Republic, has opened ore at a depth of 125 ft** below its previous 8th level. The grade of ore on the 9th level is similar, according to A. R. Patterson, general superintendent, to that of the 8th.

Present production of the mine is 200 tons of silver-gold ore. "If lateral development at the new depth proves good, it will add several years to the life of the mine," Patterson said.

**Pacific Northwest Alloys plant at Mead will employ 100 more men due to a** contract with the Federal Government. It was reported that 73,000 tons of chrome concentrate from Nye, Mont., and Coquille, Ore., were released by General Services Administration to be converted by the Alloys company into lump low-carbon ferrochrome. The work will require about 22 months. The product will revert to the Federal Government.

**Henry J. Kaiser's third gypsum plant,** located near Duwamish River in Seattle, started production Sept. 17. About 170 will be employed with an annual payroll of $750,000.

**Sherman Creek area, in Ferry County, had about 80 uranium claims filed during September,** according to reports from Republic. Each claim represents about 20 acres.

Burl Fowler of Republic reported finding uranium-bearing ore while prospecting for tungsten. He and R. R. Inbody of Ritzville are building a road and making open cuts to prove up their claims.

## WYOMING

**Ideal Cement Co. of Denver has purchased the Federal Government's** experimental alumina plant at Laramie, for $1.2-million.

The plant was built during World War II, at a cost of $4.5-million, to experiment on recovery of alumina from anorthosite ores found near Laramie. Ideal is expected to use the plant for its aggregate operations.

**An extensive drilling program is being planned by Vitro Uranium Co.** on 57 claims in the Gas Hills area of Fremont County.

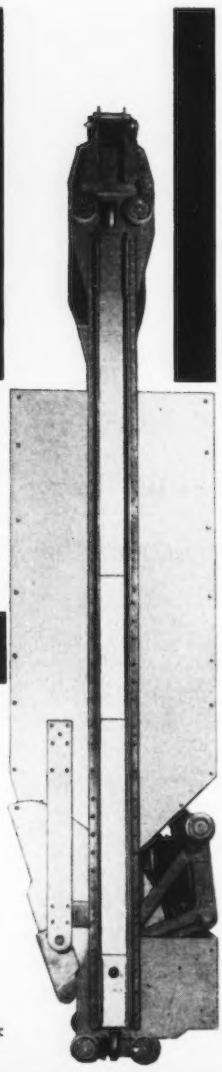
The claims, leased from the Sateco Uranium Co. of Lander, include the Gunnell group from which commercial ore shipments already have been made.

The Rochester-Pittsburgh Coal Co., third largest independent coal mining concern in the nation, is co-operating with Vitro Uranium in the Gas Hills operation.

**Discovery of "apparent" commercial ore**


Speed
HOISTING
Safely!

Connellsville
Bottom-Discharge
SKIPS



Custom-Built to meet your needs

Connellsville Skips are custom-built to meet your particular hoisting requirements with these design features providing economy, safety and speed of operation:

- Fully automatic, skip requires minimum travel for dumping . . . unbalanced loaded skip easy to accelerate.
- Toggle-locked chute prevents skip from discharging while in transit . . . no spillage.
- Sturdily constructed for severe conditions . . . practically maintenance free . . . structure includes best patented safety devices.

Connellsville Skips are your assurance of long, safe, economic mining operations. *Write today for complete details.*

CONNELLSVILLE
MANUFACTURING & MINE SUPPLY CO.
CONNELLSVILLE, PENNSYLVANIA

"Serving the Mining Industry Since 1901"

## 3/4" and 5/8" O-B Bail-Type Units Factory-Assembled for Easy Installation

- Now available in both sizes, O-B Bail-Type Shells and Plugs offer you several patented features that insure faster, easier installation.
- Units are factory-assembled with shells and plugs in correct relation to each other, allowing you to easily fit them into minimum size holes.
- O-B Bail-Type unit design eliminates costs of upset ears on bolts or other auxiliary devices to support shell during installation.
- Holding power of O-B's 3/4" and 5/8" Shells and Plugs exceeds breaking strength of roof bolts. Maximum expansion also assures you improved holding power in soft material.

**Ohio Brass**

**MANSFIELD OHIO, U. S. A.**

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers

4502-M

See Special June Haulage Ways on O-B Bail-Type Unit Installation

## Wyoming *(Continued)*

**on five claims in the Gas Hills District** is claimed by Uranium Petroleum Co. of Salt Lake City, Utah. Upetco, which also has operations in Utah, expects to open a branch office at Moneta, Wyo.

Sample shipment of 4650 lb of ore which assayed 7.24% uranium oxide and was valued at $1200 a ton, including bonus payments, was reported by the Green River Oil and Uranium Co. The company owns claims in the Gas Hills.

A. A. Cheney, vice president of Green River, said a previous shipment brought $258 a ton, including bonus payments.

# IN CANADA

## BRITISH COLUMBIA

**Decision is expected momentarily by Reynolds Metals Corporation on whether or not it will share in proposed $270-million Frobisher development** in northern British Columbia-Yukon area.

In statement from Richmond, Va., R. S. Reynolds, president of the giant American corporation, informed local sources he expects to have a report soon from his engineers on the price of power and a plant site.

As result of recent talks Reynolds' agents have had with government here, it is understood the former would accept between 30 and 50% of capitalization cost.

**First shipment of aluminum for eastern Canadian industries left Kitimat** when Vancouver-based tug "Burnaby Straits" hauled 600 tons of ingots to the Canadian National railhead at Prince Rupert for shipment to Eastern Canada in early October.

Straits Towing, Ltd., of Vancouver will continue the barge service until CNR spur from Terrace to Kitimat is completed early next year.

**Strike at Bluebell Mine at Riondel ended** with signing of agreement creating 3c per hour increase in wages across the board effective Sept. 1, 1953, plus a further graduated increase from 1½c to 6c. per hour effective June 1, 1954.

In joint statement, Consolidated Mining and Smelting Company of Canada Limited and Bluebell sub-local 651, International Union of Mine, Mill and Smelter Workers, announced new rates for laborers were $1.38½ per hour; miners $1.68½ per hour and tradesmen $1.78½ per hour.

**Increase in production of Canadian lead and zinc in immediate future is not anticipated** since price firming within range of one or two cents per lb will not be sufficient to justify much new production.

Possibly two or three of the small to medium tonage producers now shut down might resume operations, but their output would not be important in overall picture.

Also, Canada's position with regard to "supplemental stockpile" of foreign-produced lead and zinc is not clear. Some Canadian farm groups are demanding tariff protection against U. S. competition. Maintenance of present export volume at slightly better prices is best that can be hoped for.

**Operation of Island Mountain mine has been taken over by Cariboo Gold Quartz,** following ratification of sale of property by shareholders of Island Mountain Mine Co., Ltd.

Extraordinary meeting of shareholders in Vancouver unanimously approved of the sale of the 32-claim group known as the Island Mountain mine, together with all equipment, and all buildings to Cariboo.

In addition to net current assets of $560,047, and the $300,000 received from Cariboo Gold Quartz under terms of purchase agreement, the company owns the mill, power plant and other items valued at some $100,000 and the Myrtle and Proserpine groups of claims, also in the Cariboo district.

Island Mountain underground crew has been retained and will become members of Cariboo Gold Quartz organization. Ore is being shipped at rate of 120 tons daily.

**Cost of building road or railroad 40 mi into Granduc copper property near**


**Product Information**
1 special data available, giving physical and chemical properties of many B&A Fine Chemicals, uses, etc.

**Handling & Storage**
2 information on proper methods of handling and storing B&A Fine Chemicals in your plant or laboratory.

**Technical Service**
3 advice and counsel on production problems involved in using such chemicals.

**Special Chemicals**
4 developed to meet your particular needs in pilot plant or process quantities.

**If You Use Fine Chemicals Make B&A Part of Your Working Team**

**It's teamwork** that produces outstanding results and makes everyone's job easier. You get the advantages of real teamwork when you use Baker & Adamson Fine Chemicals for production or research. Long experience has given B&A a wealth of knowledge on the properties, use and handling of the many B&A Fine Chemicals in countless applications. This knowledge may prove all-important in helping you solve particularly knotty technical problems!

**Here's how we help:** A member of our sales or technical service staff provides you with product information . . . endeavors to help you determine the best way to get top results with a particular B&A Fine Chemical. Or he may suggest a special chemical best suited to your particular purposes. He'll gladly consult with you on other matters, too, such as efficient methods of product handling and storage, safety precautions, etc.

This teamwork—some of the services are outlined at the left—is available to you at all times . . . just phone or write your nearest B&A office.

= *Real Help When You Need It!*

REAGENTS B·A STANDARD OF PURITY FINE CHEMICALS

BAKER & ADAMSON® *Fine Chemicals*
GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

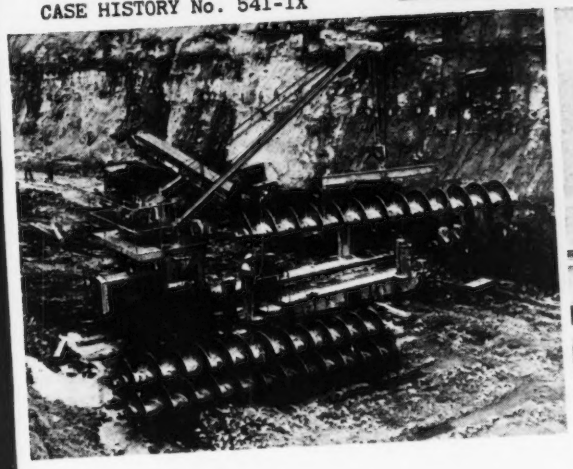
*Offices:* Albany* • Atlanta • Baltimore* • Birmingham* • Boston* • Bridgeport* Buffalo* • Charlotte* • Chicago* • Cleveland* • Denver* • Detroit* • Houston* Jacksonville • Kalamazoo • Los Angeles* • Minneapolis • New York* • Philadelphia* Pittsburgh* • Providence* • St. Louis* • San Francisco* • Seattle • Kennewick* and Yakima (Wash.) • In Wisconsin: General Chemical Company, Inc., Milwaukee

In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver*

SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

*Complete stocks carried here

GM DIESEL
CASE HISTORY No. 541-1X



**OWNER:** Peel Tree Mine, Clarksburg, W. Va.

**INSTALLATION:** GM "4-71" Diesel powers 42" McCarthy Coal Recovery Drill built by Salem Tool Company, Salem, Ohio.

**PERFORMANCE:** Mines up to 500 tons coal per day with 3-man crew. Works 9 to 11 hours per day drilling 170-foot holes 42" in diameter.

GM
GENERAL MOTORS
DIESEL POWER

# MINES 500 TONS PER DAY
## *with GM Diesel Power*

Quick-acting General Motors 2-cycle Diesel power speeds production and cuts costs in every kind of mining operation.

With power at every piston downstroke from 2-cycle operation, a GM Diesel accelerates faster, responds to controls quicker. It fits where other Diesels won't in many kinds of mining equipment because it packs more power into a smaller, lighter engine. Clean simple design makes maintenance easy, speeds servicing. And when parts are needed, GM Diesel distributors give quick delivery at low cost.

Call in your GM Diesel distributor for full details on GM Diesel power for your mine. And before you buy a Diesel, check parts costs, too. For example, GM Diesel cylinder liners cost up to 40% *less* than liners for other Diesels of comparable power. That's one reason why GM Diesels cost less to buy and less to maintain than other Diesel engines.

**DETROIT DIESEL ENGINE DIVISION**
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines... 30 to 300 H.P. Multiple Units... Up to 893 H.P.

## British Columbia *(Continued)*

**Stewart on Portland Canal will be shared by B. C. Government.**

Lands and Forests Minister Sommers said province will contribute a "reasonable percentage" if company and Federal government "play their part."

Preliminary surveys for railroad from property at glacier elevation to tidewater have been started. Company is also surveying for mill for reduction of copper ore to concentrate which will shape Granduc up as a major copper ore prize.

No official tonnage estimates made yet, but company is in sight of its 15- to 20-million-ton objective.

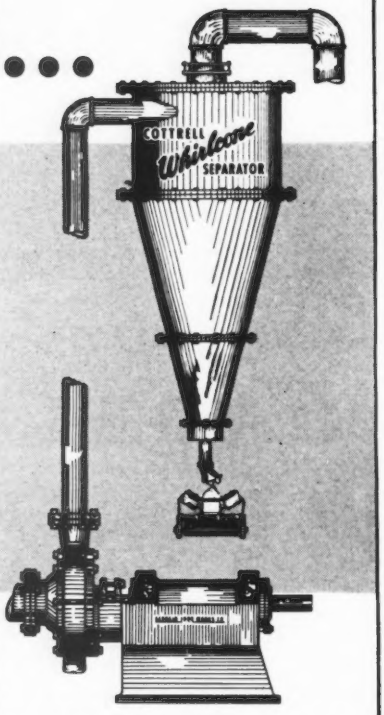
**Capacity of the new aluminum smelter at Kitimat will be immediately expanded** to produce an additional 60,000 tons of aluminum ingot per year to meet the estimated increase in the near term demand for the company's aluminum, it was announced by Nathanael V. Davis, president of Aluminum Limited.

Davis said that authorization has been given for the engineering staffs of the operating subsidiary, Aluminum Company of Canada, Limited, to proceed with the ordering and installation of a fourth generator of 140,000 horsepower capacity for the Kemano powerhouse and with the construction of additional smelter facilities at Kitimat which will increase by 65% the present rated capacity of the aluminum plant. Estimated fixed capital requirements of the new B. C. expansion program, excluding alumina facilities, are $45-million to be expended in 1955 and 1956.


Now You Can Recover Your Fines With This...

COTTRELL Whirlcone SEPARATOR
PAT. PENDING

Thousands of tons of valuable sand in the minus 50 mesh range are lost with wash water in Sand Plants all over the world. The well-known Cottrell Whirlcone Separator will save this sand at small cost.




COTTRELL ENGINEERING CO.
DIVISION OF
GIW
GEORGIA IRON WORKS CO.
MARBURY ST., AUGUSTA, GA.

The Whirlcone will de-slime and dewater these fines with approximately 95% efficiency in the plus 200 mesh range. There is a GIW Slurry Pump and a Cottrell Whirlcone Separator combination to fit any plant flow sheet. If you are losing fines, let us have your inquiry giving approximately the volume of flow and the nature of the losses. Our recommendations and literature will follow.


## MANITOBA

**International Nickel Co. of Canada, Ltd., will deliver a total of 4.5-million lb of refined nickel to GSA** in the next 10 months according to Ralph D. Parker, Inco president.

Agreement was signed with GSA to refine certain nickel concentrate produced by Sherritt Gordon Mines, Ltd., at Lynn Lake, which represents an excess of the mine's production.

Performance of contract will be in addition to Inco's increased annual production of 275-million lb and Sherritt Gordon's scheduled rate of 18-million lb of nickel for 1955.

## ONTARIO

**A deep drill hole of significance to the whole Blind River area** has been pulled at the Nordic Lake property of Algom Uranium Mines.

At a vertical depth of 2000 ft, greatest depth yet reached on the middle belt of the favorable conglomerate beds, the hole returned 6.5 ft averaging 0.08% $U_3O_8$ per ton, including a 3.0-ft section averaging 0.12%.

The intersection is described as typical of the structure on which the Algom mine is being developed.

**One of the newest entrants to the Blind River field is Maneast Uranium Corp.,** formerly known as Manitoba and Eastern Mines, but reorganized on a basis of one new share for five old.

The company has secured a 50-claim uranium prospect adjoining Algom's Quirke Lake property in Twp. 144, and is starting a program of surface prospecting.

**Other new companies in the area include Buckles Uranium Mines,** with encouraging results reported from drilling on a group adjoining Algom's Nordic Lake ground; Geneva Lake Mines, long idle on its original lead-zinc property in the Sudbury district, but with a newly-acquired group of 18 claims alongside the Buckles ground; Magoma Mines, financed by Pioneer Gold Mines of B.C., drilling a property near the Algom at Quirke Lake (and which also holds a 10% interest in two Colorado Plateau groups); Consolidated Denison Mines, with drilling in progress in the Quirke Lake section; and Peerless Uranium Mining Corp., with 18 claims south of the Nordic property.

**Iron ore shipments by Steep Rock Lake Iron Mines have been running well be-**

# METAL RECOVERY *by* *Ion Exchange Processes*

• New Ion Exchange techniques hold great promise of revolutionizing hydrometallurgy to achieve greater recovery and lower costs.

Permutit — the leader in Ion Exchange — is uniquely equipped to cooperate with you in developing these techniques to meet your requirements. Permutit Ion Exchange equipment and resins are widely used in many metal recovery and purification applications closely related to your leaching operations.

The bulletins listed at left describe several successful applications of Ion Exchange techniques which might be applied to the field of hydrometallurgy.

**Ion Exchange for Concentration and Recovery of Metals** — A technical bulletin describing the background of ion exchange and discussing the wide use ion exchange has found in the concentration and recovery of metals from dilute solutions.

**Metal Recovery by Ion Exchange** — Interesting technical bulletin outlines the recovery of metals from dilute processing solutions containing metals as well as precious metal recovery by anion exchange.

**Metal Recovery by Cation Exchange** — This paper reports two unique processes: The recovery of tin from sodium stannate solutions and the recovery of metal cations from acidic solutions.

**Metal Recovery by Anion Exchange** — A report on the recovery of chromium, gold, iron, molybdenum, palladium, platinum, and vanadium, in the form of complex anions, from dilute solutions.

**Permutit Ion Exchangers** — A 12-page bulletin summarizing the properties of Permutit Ion Exchangers and applications ranging from the treatment of water to the recovery of metals from solutions, the separation of rare earths, etc.

**PERMUTIT®**

ION EXCHANGE AND WATER CONDITIONING HEADQUARTERS FOR OVER 40 YEARS

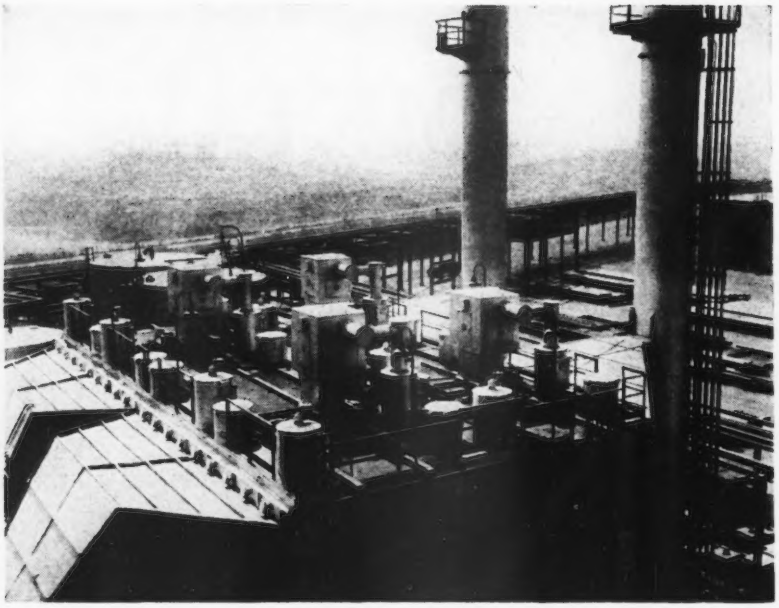
## CLIP THIS COUPON FOR INFORMATION

**THE PERMUTIT COMPANY, DEPT. EMJ-11**
**330 WEST 42ND STREET, NEW YORK 36, NEW YORK**
***Please send me the literature checked below:***

- ☐ Ion Exchange for Concentration and Recovery
- ☐ Metal Recovery by Ion Exchange
- ☐ Metal Recovery by Anion Exchange
- ☐ Metal Recovery by Cation Exchange
- ☐ Bulletin—Permutit Ion Exchangers

**NAME**_____
**POSITION**_____
**COMPANY**_____
**ST. & NO.**_____
**CITY**_____ **ZONE**_____ **STATE**_____

*(In Canada, please forward to Permutit Company of Canada, Ltd., 6975 Jeanne Mance St., Montreal)*



NOTHING SUCCEEDS LIKE SUCCESS . . .

**Buell 'SF'**

**Electric Precipitators**

**PROVE IT AGAIN!**

Spectacular on-the-job performance started engineers talking . . . and it's been music to our ears ever since.

Our engineering friends have marvelled at low maintenance costs . . . at brand new efficiency records . . . at the wide range of different and complex dust recovery problems that are being solved by Buell's 'SF' Electric Precipitators.

We will be happy to demonstrate the finer points at any time. Such standard Buell features as continuous rapping . . . convenient remote control from a central switchboard . . . the proved efficiency of the exclusive Buell Spiralectrode, are all elements of simple overall design.

Dozens of Buell 'SF' Electric Precipitators are already operating or in the works. Get the complete facts now. Write for our informative Brochure "The Collection and Recovery of Industrial Dusts" which tells about *all three* Buell Systems of industrial dust recovery. Write today! Buell Engineering Company, Department 19-K. 70 Pine St., New York 5, N. Y.

buell®

MECHANICAL ELECTRICAL *20 Years of Engineered Efficiency in* DUST RECOVERY SYSTEMS

**hind 1953 records this year,** to follow the trend set by other leading companies in the industry.

The two Steep Rock mines, near Atikokan in Northwestern Ontario, had shipped approximately 775,000 tons at the end of September, compared with 875,000 tons in the corresponding part of 1953.

**Geco Mines, big copper-zinc prospect in the Manitouwadge area,** reports indicated ore reserves at 14.9-million tons averaging 1.72% copper, 3.55% zinc, and 1.73 oz of silver per ton.

This calculation includes a 10% dilution factor, and indicates gross value, at current metal prices, of $19.50 per ton. No further surface drilling is planned at present, activities being concentrated on plans for production.

These plans include a mill with initial capacity of 3300 tons daily, with provision made for fast expansion as required. Possible expansion plans can be visualized from the shaft design, which calls for hoisting capacity of 5000 tons of ore daily, in addition to waste rock. Geco is controlled and financed by The Mining Corporation of Canada, big affiliate of Noranda Mines.

**Violamac Mines, B.C. lead-zinc producer, has extended its interests into Ontario** with acquisition of a copper prospect in the Cirrus Creek section of the Kilalla Lake area, some 25 mi southwest of Geco.

Limited work on the 18-claim property, which covers part of the Cirrus Creek anomaly, has disclosed a brecciated rhyolite shear zone extending for 2000 ft, with good copper values indicated in several trenches. Diamond drilling is planned.

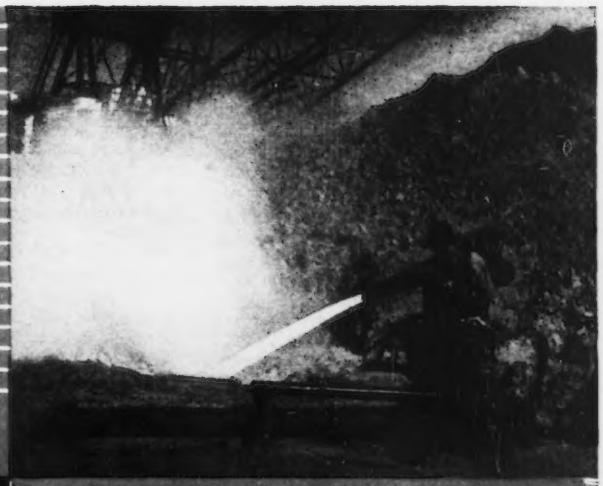
**Not far from Violamac, Bamoos Lake Mines reports encouraging results** from drilling on a big zone that shows magnetite mineralization across widths up to 100 ft. The material is complex, showing minor values in copper, vanadium, and columbium as well as iron.

**Teck-Hughes Gold Mines has been proving the old adage that good mines die slowly.** On a salvage basis for several years, with suspension of operations expected each year, this Kirkland Lake veteran has been able to postpone that eventuality each time it appeared to be nearing.

Latest encouragement has been found on the 33rd level, where a new branch vein has appeared. Lying south of the main break, the vein has been opened for 200 ft with grade above mine average.

In the meantime, Teck-Hughes continues to expand its outside activities. In a deal with Consolidated Howey Mines, which happens to be one of its own largest shareholders, Teck has undertaken to finance exploration of the Howey claims adjoining Geco Mines on the south in the Manitouwadge area. The 45-claim prospect looks promising on the geophysical maps, and will be thoroughly tested by drilling to determine the potential of the property. See E&MJ, July 1954, p 116.

# EARTHMOVER



Controls are operated by water pressure. Intelli-Giant operates at 30-300 lbs. pressure.

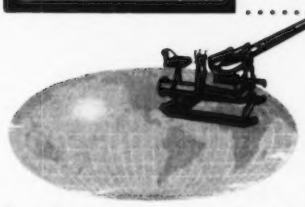
Operator in sitting position controls movement of gun —320° horizontally, 120° vertically—with no effort.

# 1955 MODEL...

Write TODAY for NEW illustrated brochure

CHIKSAN COMPANY Brea, California Dept. 11-EMJ

**new** *chiksan intelli-giant does the job cheaper!*

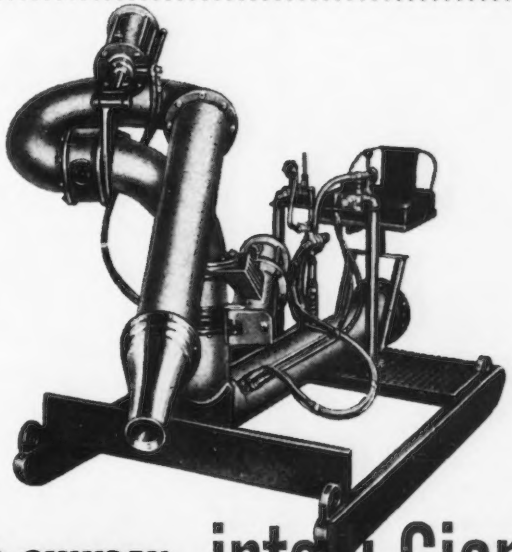


One progressive operator of hydraulic monitors in the phosphate fields of Florida has estimated a saving of 7,000 man hours a year, based on three shifts, or a total of over $10,000.00 by employing Chiksan Intelli-Giants to do the job.

Another large operator estimates that thru the larger area of earth covered and the use of 3 Chiksan Intelli-Giants hooked up in remote control they will save approximately $22,000 a year in direct labor costs.

After 8 years of exhaustive engineering and field testing, under the most exacting conditions, CHIKSAN has introduced the FIRST revolutionary improvement in hydraulic mining and earth moving in 90 years.

Exacting tests in the removal of perma-frost in Alaska, sluicing in the phosphate fields of Florida, dam construction in Oregon and California have proved the high efficiency and extreme economy of the NEW CHIKSAN INTELLI-GIANT.



CHIKSAN intelli-Giant

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 3, Illinois • Newark 2, New Jersey

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Co., Brea, Calif., Newark 2, N. J. • Chiksan of Canada Ltd., Edmonton, Alta.

## Ontario *(Continued)*

**The Cobalt camp has added another silver-cobalt producer to its list.** The 100-ton mill of Nipissing-O'Brien Mines started operations last month, with production expected to reach 60,000 oz of silver per month.

The property is a merger of two veterans of the early days, the Nipissing and the O'Brien, both of which were prolific silver sources, but the mill is a new installation. The company is jointly owned on a 55-40 basis.

**Peter-Rock Mining Co. reports encouraging copper values** from drilling its 15-claim property in a new area 5 mi north of Espanola in the Sudbury Mining Division.

Work is being continued, and plans are being made for start of exploration on a second group, a short distance to the south, on which several areas of radioactivity have been indicated.

**International Nickel Company of Canada has ordered Dravo-Lurgi iron ore pelletizing equipment** for its Copper Cliff plant. The pellets will be hardened on a continuous, straight-line sintering machine.

The new equipment, ordered from Dravo Corp., Machinery Division, Pittsburgh, Pa., will be manufactured in accordance with basic designs of Lurgi Gesellschaft fur Chemie und Huttenwesen M. B. M., Frankfurt, A. M., Germany. One of the largest iron ore sintering machines ever built in this country, the new machine will be 8 ft 3 in. wide.

Lurgi Chemie Down-Draft Sintering Process has become accepted throughout the world since its introduction in 1906. At the present time, Lurgi machines process 90% of the iron ore sintered in Germany. Yearly output of Lurgi installations throughout the world, treating iron ore alone, totals more than 30-million tons.

**A 200-acre uranium prospect has been acquired by Kenmac Chibougamau Mines** in the Bancroft area, adjoining the Croft Uranium property in Cardiff Twp. Surface work is planned on a number of dikes from which radioactive indications have been obtained.

**Caral Mining Co. is having a magnetometer survey made on its two 27-claim groups at Wullie Lake,** about 12 mi northwest of Marathon on the north shore of Lake Superior. Preliminary work has indicated the possibility of developing magnetic iron in large tonnages.

**Copper mineralization across widths of 25-30 ft has been indicated by shallow drilling** on the property of Kenogamisis Gold Mines in the Pic River area, northwest of Marathon. While not of ore grade, values were better than those found on surface, and deeper drilling is planned.

**Cubar Uranium Mines has acquired mining rights on a substantial deposit of garnet** in Dana Twp., 25 mi north of Sturgeon Falls. The garnet, of Alamandite type, is found in a zone of soft mica schist, and will be mined by open cutting. The product will be ground in a mill being established in Sturgeon Falls.

**Paymaster Consolidated Mines has resumed mining and milling at its gold property in the Porcupine area,** where operations were suspended in December 1953, when operating costs became excessive. Initial milling rate on resumption was 175 tons daily, and it is expected that full rate of 475 tons will be reached by the end of October.

## QUEBEC

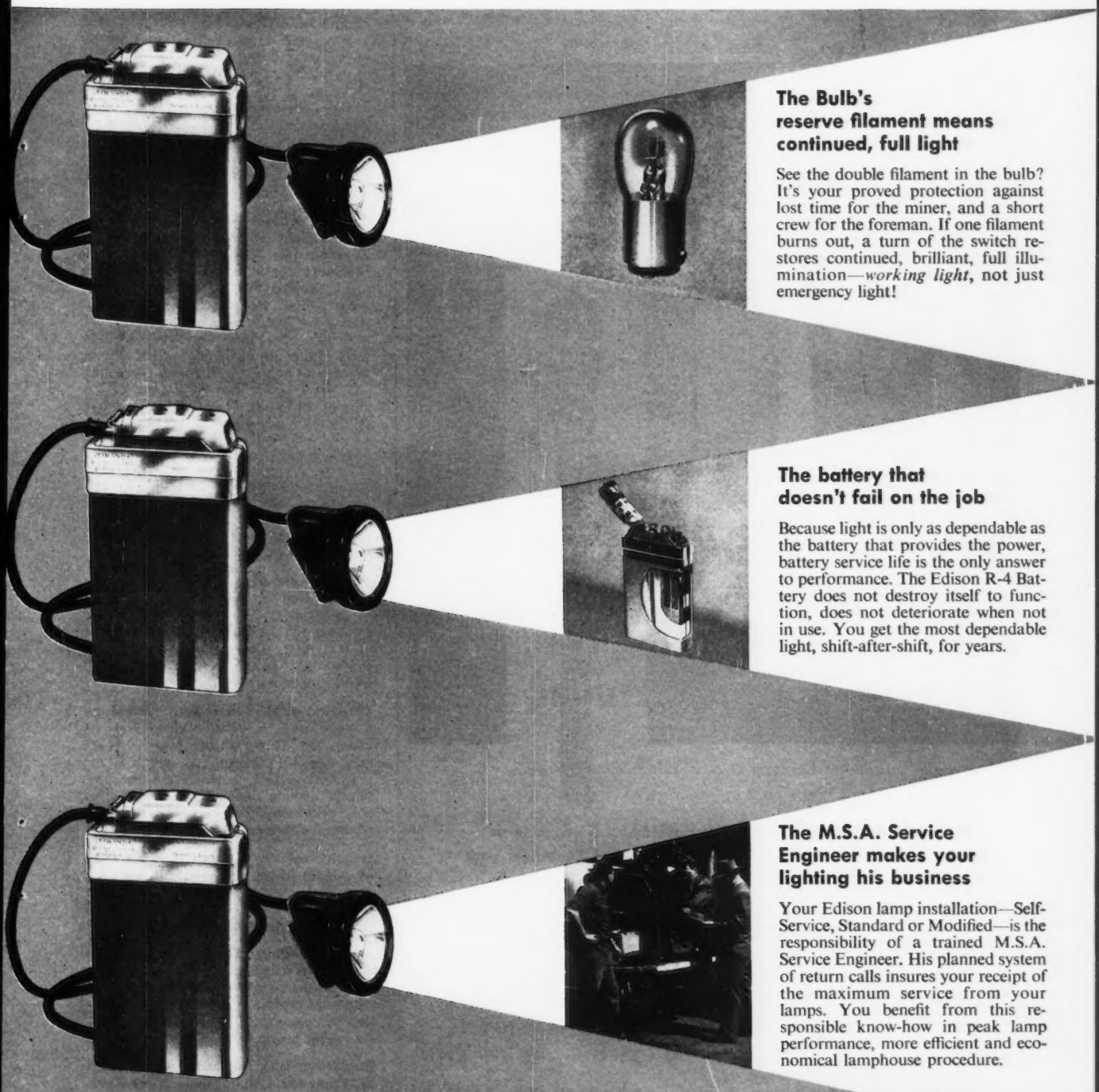
**Quebec Copper Corp., new copper producer in Wolfe County, Eastern Townships area,** has shown a fine production record during its opening months, and by year-end will have repaid the loan by which mill construction was financed.

Daily milling rate has been worked up to 800 tons, almost double the starting rate, and recovery has been running 95%. Plans have been made to deepen the shaft another 500 ft to open three more levels, deepest at the 1650-ft horizon.

**Investigations are being continued by the Cyrus Eaton interests of Cleveland** into

"We CHOPPED DOWN Our OVERHEAD"
With
OSMOSALTS and OSMOPLASTIC
the MINE PROVEN wood preservatives that make timbers last 3 to 5 times longer
With labor costs UP and profits DOWN, here's important news for you! By OSMOSE TREATING all timbers for permanent places, it's possible for you to SAVE AS MUCH AS 50% on your annual timbering bill. This is not our claim! Mining men everywhere are making this statement.
Osmose-treated timbers last 3 to 5 times longer and SAVE YOU not only the cost of new timbers . . . but also the labor cost of replacement, which amounts to more than twice the cost of the timbers. You can (1) Treat your own timber with inexpensive Osmose products or (2) Order ALL TYPES of Osmose-treated mine timbers from us. Either way you save PLENTY! Write for details.
Send for this FREE book!
"Force Down Your Operating Cost" is a new 16-page book that shows and tells all about the Osmosalts treatment. Write for it today!
OSMOSE
OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.
980 ELLICOTT STREET, BUFFALO 9, NEW YORK
Branches: DENVER, COLO. and BIRMINGHAM, ALA.

# You can depend on the EDISON R-4's brilliant, unfailing light...



**The Bulb's reserve filament means continued, full light**

See the double filament in the bulb? It's your proved protection against lost time for the miner, and a short crew for the foreman. If one filament burns out, a turn of the switch restores continued, brilliant, full illumination—*working light*, not just emergency light!

**The battery that doesn't fail on the job**

Because light is only as dependable as the battery that provides the power, battery service life is the only answer to performance. The Edison R-4 Battery does not destroy itself to function, does not deteriorate when not in use. You get the most dependable light, shift-after-shift, for years.

**The M.S.A. Service Engineer makes your lighting his business**

Your Edison lamp installation—Self-Service, Standard or Modified—is the responsibility of a trained M.S.A. Service Engineer. His planned system of return calls insures your receipt of the maximum service from your lamps. You benefit from this responsible know-how in peak lamp performance, more efficient and economical lamphouse procedure.

MSA
SAFETY EQUIPMENT HEADQUARTERS

*When you have a safety problem, M.S.A. is at your service ... our job is to help you*

**MINE SAFETY APPLIANCES CO.**
201 North Braddock Avenue, Pittsburgh 8, Pa.
At Your Service: 77 Branch Offices in the United States and Mexico

**MINE SAFETY APPLIANCES CO. OF CANADA, LTD.**
Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, Sydney, N.S.

These Edison R-4 QUALITY features, and service, give you that *extra* illumination that lets you realize every production advantage from today's mechanized equipment. Let us show you how this vital mining tool can help fill the gap between average and peak production with greater safety. Write for details.

# WEST VIRGINIA ROOF BOLTS

## Give you Economy, Safety, Improved Ventilation, Lower Cost Per Ton . . .

New design EXPANSION SLEEVE roof bolts have one piece shell. No ears or pal nuts needed. Shell finger extension over bolt end gives fast, sure initial anchorage. Deeper, angular teeth give greater holding ability.
WEDGE-TYPE roof bolts give maximum holding power. Wedge size to suit type of anchorage. Easy to install, thanks to careful threading.
DRILL
13/8

Service-proven West Virginia roof bolts mean fewer mine accidents and a faster mining cycle. Get increased headroom and storage space, faster movement of men, machinery and coal.

Both wedge and expansion type bolts available in all lengths. Special steel in plate makes cupping of washers unnecessary. Smooth-rolled threads are waterproof-wrapped and spray-protected. Write today for information on how West Virginia roof bolts make mining faster, safer!

BETTER PRODUCTS West Virginia STEEL & MFG. CO. HUNTINGTON, W. VA. FOR BETTER MINING

**West Virginia Steel**

**AND MANUFACTURING COMPANY**

**HUNTINGTON, WEST VIRGINIA**


## Quebec *(Continued)*

the possibility of establishing an iron ore industry on the west coast of Ungava Bay in the far northern reaches of New Quebec.

Large tonnages of low to medium grade iron are in evidence on the extensive ground held by the group's two companies, Atlantic Iron Ores Ltd., and International Iron Ore Co., one deposit alone giving estimates up to 60-billion tons. Plenty of hydro power is available.

As the area is uninhabited and barren, the project would involve large capital expenditures, and will call for a great deal of study; but the planners are visualizing a day when up to 3-million tons of concentrates will be shipped annually, the probable market being in Europe.

**Rainville Copper Mines has started unwatering the shaft at its property in Bourlamaque Twp.,** Val d'Or area, following completion of new financing arrangements with Canadian Malartic Gold Mines. Both companies are controlled by Ventures Ltd.

Before operations were suspended in 1953 Rainville had done 7122 ft of drifting on five levels, the work indicating 352,700 tons of ore averaging 2.32% copper, all in No. 4 zone. Main objective of the new program will be exploration of the No. 2 zone, believed to hold excellent possibilities.

**An option has been taken by Montbar Mines on the five-claim property of** Mogador Mines in Barraute Twp., and diamond drilling is planned to test its base metals possibilities.

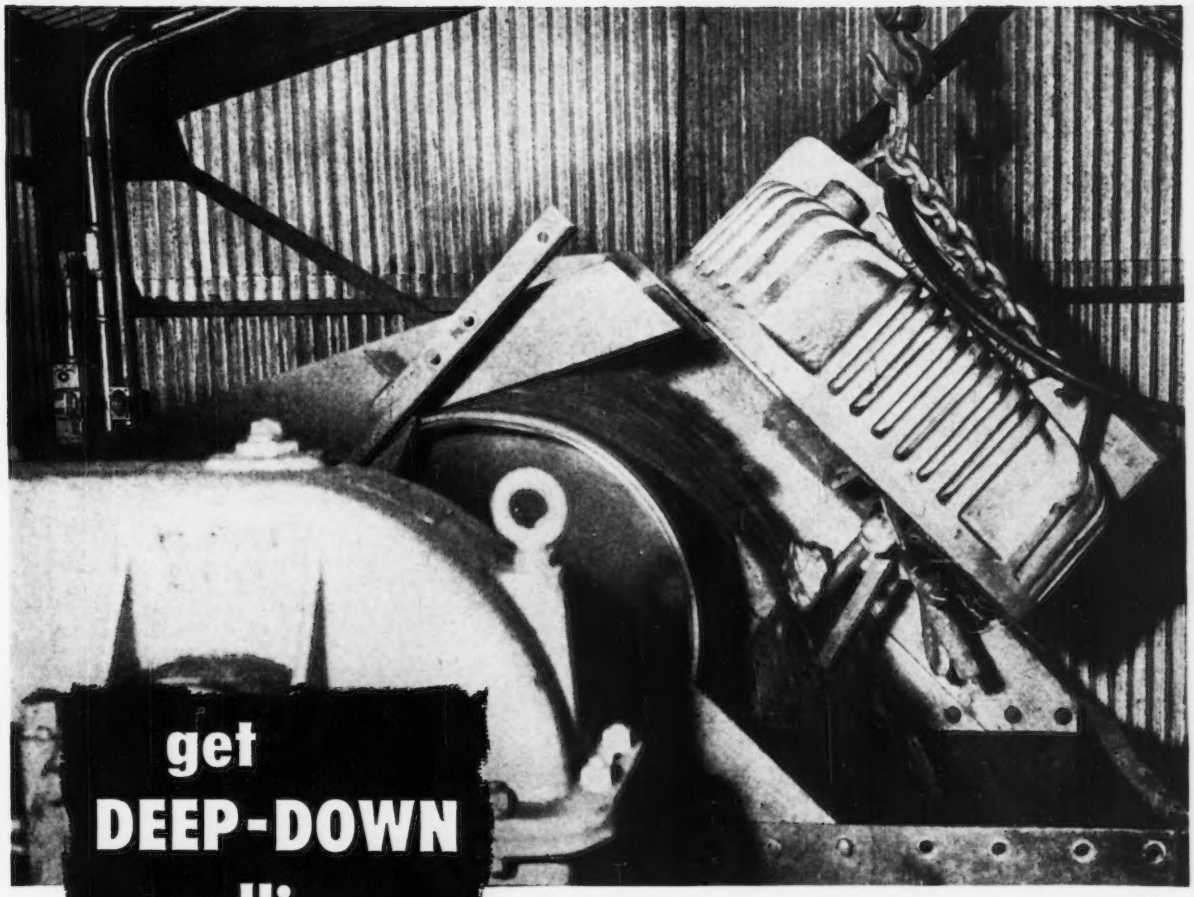
**Surface exploration is in progress on the ground held by Romac Mines** in La-Corne Twp., southwest of the Quebec Lithium holdings about 20 mi northwest of Val d'Or. The claims, 600 acres in extent, are believed to present good lithium chances.

**Diamond drilling has been started by** Consolidated Halliwell Mines on its claims in Huddersfield Twp., 55 mi northwest of Ottawa. The search is for uranium, surface work during the past season having indicated a radioactive zone with length of 2000 ft with good readings across widths up to 50 ft.

**Geophysical survey work is being done by Absam Mines** on a recently acquired group of claims in the Chibougamau area, preliminary prospecting having shown indications of copper.

**Nib Yellowknife Mines plans diamond drilling on a group of 15 claims in La Dauversiere Twp.,** Chibougamau area, where a combined electrical resistivity and magnetometer survey showed encouraging possibilities in four anomalies.

**Production may be started next March by Campbell Chibougamau Mines,** two months ahead of the previous date scheduled. Construction of the 1750-ton mill is well advanced, and mine preparation has proceeded more speedily than expected, but the most important factor is the better speed being made in power line construction.



# get DEEP-DOWN pulling

## with Stearns Suspended Separation Magnets

**CHECK THESE FEATURES**

- ✓ Coil-wound for continuous duty. Special insulation and rib-type head casting assure fast heat dissipation.
- ✓ Leads and terminals fully protected against abrasion.
- ✓ Waterproof construction.
- ✓ Vacuum-impregnated windings assure long life and dependable operation.

A Stearns circular-type, suspended separation magnet provides a tremendous pulling force that reaches far down into material on conveyor lines — prevents the escape of deeply embedded tramp iron — protects crushers and other processing equipment from costly damage.

Stearns suspended separation magnets are available in sizes ranging from 16 to 65 inches in diameter. A postcard request places nearly 40 years of research and engineering experience at your disposal. Write today.

1059

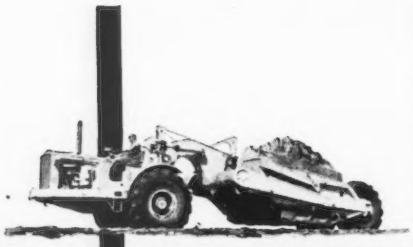
MAGNETIC EQUIPMENT FOR ALL INDUSTRY

**STEARNS MAGNETS**

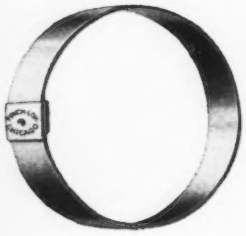
STEARNS MAGNETIC, INC. 624 S. 28th St., Milwaukee 46, Wisconsin

CATERPILLAR®

FIRST in earthmoving equipment—chooses . . .



Research Laboratories, Peoria, Illinois



PUNCH-LOK

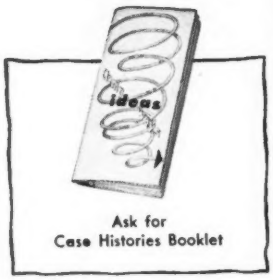
FIRST IN HOSE CLAMPS

☆ no snag

☆ everlasting

☆ fast

☆ no leak




Ask for
Case Histories Booklet

Stocked by your near-by Punch-Lok distributor

"The Sign of a Good Hose Clamp"

PUNCH-LOK Company

Dept. I, 321 North Justine Street, Chicago 7, Illinois

5295

## NEW BRUNSWICK

**Keymet Mines is just about ready for milling,** and should be turning out lead and zinc concentrates before the end of the year at its mine northwest of Bathurst.

Reconstruction of the 200-ton mill, burned down last spring, is practically completed; and in the meantime the shaft has been deepened to 1200 ft, to permit the addition of two new levels. Keymet will be the Province's first lead-zinc producer.

## NORTHWEST TERRITORIES

**Construction of a 300-mi railway link from Grimshaw, Alberta,** to Hay River, Northwest Territories, on Great Slave Lake in the near future is being discussed as a result of significant mining developments in Canada's Northland.

G. H. Finland, manager of the Alberta & Northwest Chambers of Mines, said assurances had reached his office that plans under consideration since early August for increased transportation facilities "definitely will go through."

Final and official announcement is expected to be made by the federal government upon completion of detailed studies by survey parties and engineers for determination of an exact route.

Jean Lesage, minister of northern affairs and national resources, said in Edmonton following a tour of the Northwest Territories in August that the possibility of the railway link has been discussed with officials of the mining industry throughout the area.

Officials of Consolidated Mining and Smelting, which has a huge amount of proven ore at Pine Point, British Columbia, were chief participants in the railway discussions. All mining interests were described as highly enthusiastic about the prospects of a railroad as they feel it would be a major step ahead in development of the rich north country.

## ALBERTA

**Surveys to determine the quantity of Peace River iron ore deposits** have resulted in a nice round sum—one billion tons.

The extremely large tonnage was reported by D. B. McDougall, Calgary geophysicist of the Eureka River Syndicate, following a recent investigation.

Still to be determined is whether the type of ore, reported tentatively at a low grade of 35%, can be concentrated to give a higher iron content. This question is under study now.

McDougall received an iron prospecting permit last spring after deposits were found in oil drilling operations. The permit covers 99,840 acres and the area is approximately 30 mi north of Hines Creek, a terminal point on the Northern Alberta Railways, nearly 385 mi from Edmonton.

**FAMOUS 1-2 PUNCH** of tough taconite shooting—Du Pont Pelletol No. 1 plus powerful "Nitramex" No. 2. Operators like to work with Pelletol No. 1 because it's free-flowing, waterproof and doesn't cause headaches.

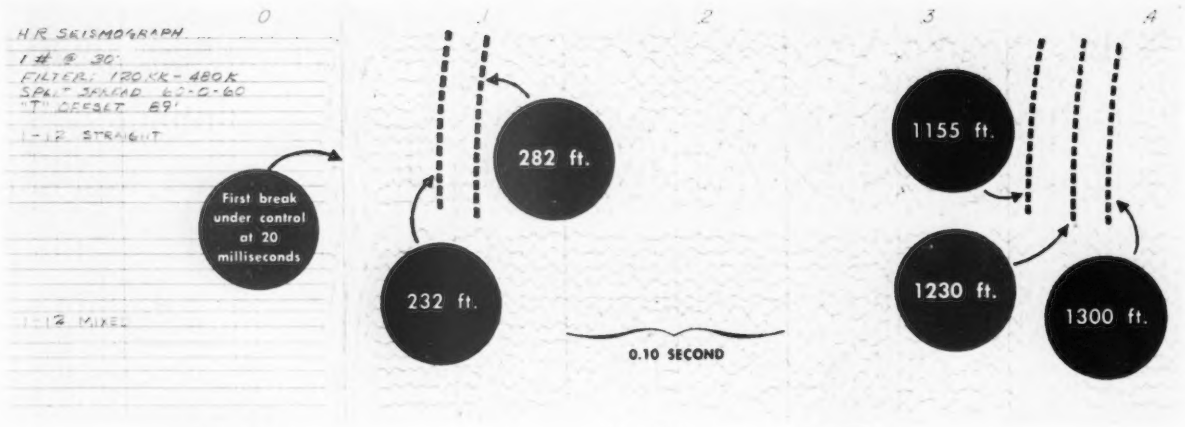
# You can break taconite better with DU PONT PELLETOL!

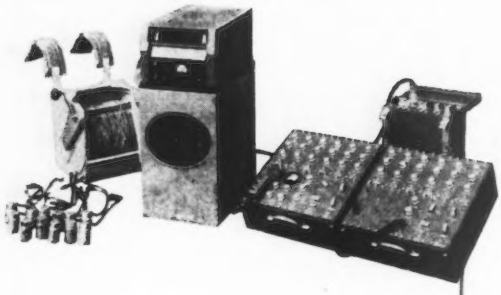
Want to break taconite better? Du Pont Pelletol poured around the charge of "Nitramex"® No. 2 can help you do it. This free-running blasting agent concentrates energy at the bottom of the holes . . . just where it's needed.

You simply pour Pelletol into holes during loading. It quickly settles to the bottom, completely filling the space around the column of "Nitramex" No. 2. Then set off the shot. High-density Pelletol adds its strength to that of the charges, giving extra energy which breaks up the taconite better. Many open-pit operators have found it's the perfect power partner for Du Pont "Nitramex" No. 2.

If taconite or other hard-shooting jobs are causing you trouble, put Pelletol to work. It's sure to help you solve the problem. For complete details on Pelletol and other members of the Du Pont ore-blasting "team," check the Du Pont representative in your district. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Del.

**DU PONT**
**BLASTING AGENTS**
*Products of Du Pont Research*
DU PONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



# High Resolution

## here's a new record for near-surface seismic data

If you're plagued with the problem of obtaining accurate near-surface seismic data, look carefully at the record illustrated here. With first breaks under control in 20 milliseconds, a reliable reflection was obtained at a depth of 232 feet. This record is typical of the results obtained by the new Houston Technical Laboratories High Resolution Seismic System. A major development in geophysical prospecting, the HTL portable HR System now makes possible reliable reflection surveys over a depth range of 100-2500 feet. It is especially designed for use in petroleum exploration, mining, ground water location, and civil engineering where shallow seismic information is vital.

**WRITE for Technical Bulletin No. S-303 for additional information about how you can now make shallow seismic surveys.**

## use the HTL portable HR seismic system to determine:

- thickness of gravels and other unconsolidated materials;
- depth and extent of buried channels;
- location and delineation of shallow mineral beds or seams, dikes, pinchouts, lenses and similar features.

HTL

HOUSTON TECHNICAL LABORATORIES

A SUBSIDIARY OF TEXAS INSTRUMENTS INCORPORATED

2424 BRANARD • HOUSTON 6, TEXAS, U.S.A. • CABLE: HOULAB

## Alberta (*Continued*)

McDougall has a 2-yr permit with the right to take out a 21-yr lease on the iron right on the lands within the prospecting area. Two other prospecting permits also were taken out for the Hines Creek area. One was issued to D. M. Vipond, independent oil operator, Edmonton, and the other to K. S. Dixon, Calgary solicitor.

# IN LATIN AMERICA

## MEXICO

**In 1954, the Mexican mining industry will produce 220,000 metric tons of lead;** 170,000 tons of zinc concentrates and 55,000 tons of refined zinc; 60,000 tons of copper and 1500 tons of silver, according to estimates of the Secretariat of National Economy.

Meanwhile, the industry reported that production averages and export values were tending to decline. The industry based this observation on the following figures:

MONTHLY AVERAGE PRODUCTION

| | 1952 | 1953 | 1954* |
|---|---|---|---|
| Gold (troy oz) | 38,343 | 38,234 | 32,493 |
| Silver (million troy oz) | 4.20 | 4.09 | 3.28 |
| Copper (metric tons) | 4872 | 5012 | 4984 |
| Lead (metric tons) | 20,502 | 18,749 | 18,459 |
| Zinc (metric tons) | 18,948 | 18,240 | 18,724 |

VOLUME OF EXPORTS
(thousand metric tons)

| | 1952 | 1953 | 1954* |
|---|---|---|---|
| Copper & Conc. | 77.7 | 85.1 | 33.5 |
| Lead & Conc. | 206.3 | 225.9 | 84.8 |
| Zinc & Conc. | 382.5 | 312.6 | 142.5 |

VALUE OF EXPORTS
(Millions of pesos)

| | 1952 | 1953 | 1954* |
|---|---|---|---|
| Copper & Conc. | 355.2 | 349.0 | 139.0 |
| Lead & Conc. | 636.7 | 448.8 | 201.5 |
| Zinc & Conc. | 411.4 | 172.9 | 75.3 |

*First five months.

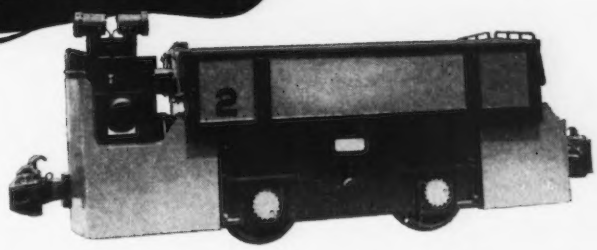
**Huitzuco quicksilver mines in the State of Guerrero are being reorganized to step up production.** The mines are owned and operated by Jose Jaidar Jimenez. Management is in the hands of Cia. Minera La Marina, Mexico City.

**Many isolated mines have been temporarily cut off from communication** with the rest of the country due to unusually heavy rains that have washed bridges and cut highways through much of Mexico. The main highway from Mexico City to Laredo was one of those rendered impassable due to the torrential rains that poured down over eastern and central Mexico.

However, federal highway crews have been working on a day and night basis to restore these roads. As preference goes to major highways, the smaller roads used by mining communities will be the last to be repaired. The dry season in Mexico beginning in November should bring an end to the troublesome rains.


GREENSBURG EIGHT TON MONITOR
Storage Battery Locomotives

...for top performance "Double Equalizers" make the difference



The Greensburg 8 ton Monitor is equipped with two glass insulated motors, contactor type controller and double equalizers. These double equalizers make the difference in performance . . . more tractive effort, better brakes, better riding qualities and longer battery life than any other storage battery locomotive of equal weight and battery capacity!

All Greensburg locomotives are Custom-Built to meet your requirements in both single and double motor drive with drum, cam or contactor type controllers.

For more earning power per invested dollar specify Greensburg Storage Battery Locomotives.

GREENSBURG MACHINE CO.
102 Stanton St.
Greensburg, Pa.

*Why Search for*
URANIUM
*with a Horse and Buggy?*

THE New ROYAL SCINTILLATOR

★ Is more sensitive than any other Scintillator or Geiger Counter
★ Easily detects *deeply* buried Uranium deposits from ground or air
★ Produces results never before possible
★ Can be used for oil field surveys
★ Made by the manufacturers of the famous "Scintillator"

Dealers Wanted

Contact your nearest dealer or write direct for complete catalog of Geiger Counters, Scintillators and metal locators including the new "Special Scintillator" priced at only $299.50.

PRECISION RADIATION INSTRUMENTS, INC.
2235 E|R So. La Brea Ave., Los Angeles 16, California
Please send Free Catalog.
NAME_____TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ZONE___STATE_____

WORLD'S LARGEST MANUFACTURERS OF PORTABLE RADIATION INSTRUMENTS

**TUNGSTEN MINING CORP. uses ROK-BITS**

Tungsten Mining Corp. of Henderson, N. C., the country's top tungsten mine, upped output from 350 to 950 tpd.

B. B. Bailey, Tungsten Mining Corp.; Clyde Patton, B. & L. R. B. Corp.; Elmer Roberts, Tungsten Mining Corp.

Tungsten carbide Rok-Bits®—chisel or cross types—gauge sizes: 1¼" thru 4".

Carbon or alloy drill steel

In drilling ore for the world's hardest metallic material, Tungsten Mining finds Rok-Bits best. For details, write plant nearest you.

**Brunner & Lay Products**

Brunner & Lay, Inc.
9300 King St.
Franklin Park, Ill.

Brunner & Lay Rock Bit Corp.
2514 E. Cumberland St.
Philadelphia 25, Pa.

Brunner & Lay, Incorporated
2425 East 37th St.
Los Angeles 58, Calif.

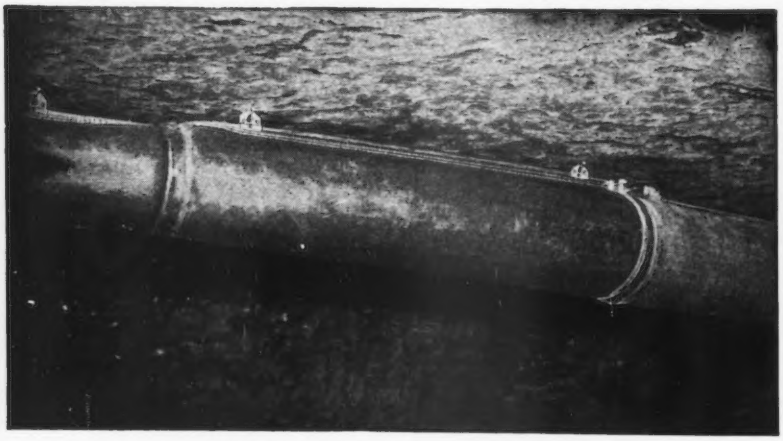
Brunner & Lay, Inc.
150 Leslie St., Dallas, Texas

Brunner & Lay Rock Bit Corp.
Sweeten Creek Road, Asheville, N.C.

Brunner & Lay Corp.
660 N. Tillamook St., Portland 12, Ore.



**SPECIFY FLEXIPIPE® the quality ventilating tubing**



Flexipipe is now available with Rope Seam Suspension *at no additional cost.* The newest, best, quickest suspension . . . eliminates special accessories and suspension wires . . . *all you need is a nail.* It equalizes strain on the tubing.

Flexipipe is efficient, serviceable, economical. Jute and heavy-duty grades available in a variety of lengths and diameters to meet your requirements.

Write for complete information and sample.

Bemis Bro. Bag Co.
408-E Pine St.,
St. Louis 2, Mo.


## Mexico (*Continued*)

**Support of the mercury market by the U. S. Government** has created some activity in Mexico. Charles Steen, Moab, Utah, has reportedly bought an interest in mercury mines in the El Doctor district near Queretaro, central Mexico.

**Ing. Salvador Trevino, manager of the Mexican Mineral Development Commission,** a federal government organization, has returned from a month's trip to the Colorado Plateau area as a guest of the Atomic Energy Commission. Uranium developments in Mexico continue to be a relatively unknown quantity.

**New coking plant, purchased in Germany at a cost of over $8-million,** for operation in Monclova, Coahuila, in conjunction with Altos Hornos steel mills, is nearing completion. One section is already producing 27,000 tons a month of coke and the entire plant, when finished, will turn out 57,000 tons a month. The firm is being operated as Cia. Mexicana de Coke S. A.

This expected new production of coke in Mexico, added to the present output of AS&R Co. (110,000 tons in Mexico), plus such smaller operators as Coke Nacional S. A. in Sabinas, Coahuila, is expected to cause a complete collapse of the coke market.

Operators say there is just not enough consumption to use up such output. There is not much chance of shutting down production as other needed products are turned out in the same operation.

The German plant for Monclova was purchased and financing arranged by the Mexican government development agency, Nacional Financiera.

Both Altos Hornos and the other big Mexican steel mill, Fundidora de Monterrey, are expanding their operation with multi-million dollar installations, but even this added demand is not expected to keep up with the coke production, according to experts in the field.

**A revised overall mining law may be introduced into the Mexican Congress** during its present session to encourage further mining development through the removal or lightening of repressive features of the present law. However, some experts say the draft so far includes only minor changes from the present Mexican mining law.

**Concessions granted by the Mexican Secretary of Economia's mining department** recently include a gold, silver, lead, copper and zinc concession near Blanca Cordon, Zacatecas, to Elias Sanchez W.; a tin concession to Alvaro Venecio for a vein he has discovered near Valparaiso Falda del Cerro, Zacatecas, and a permit to install lead and zinc crushing mills at Cucucame, Durango, to Hector Hermosillo and Javier Valenzuela of Cia. Avino S. A.

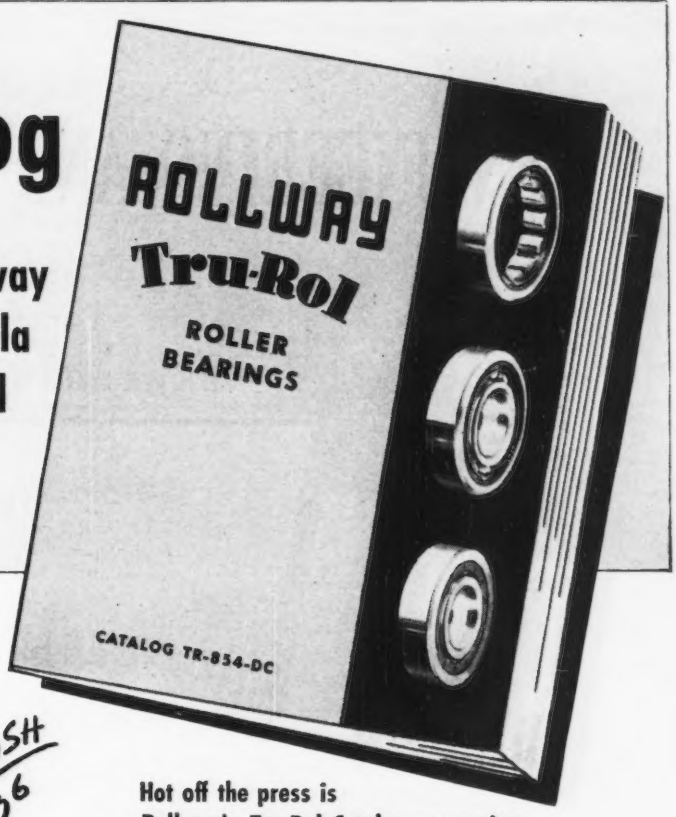
## CHILE

**First lot of pig lead produced by Cia. Minera Aysen** located on the shores of

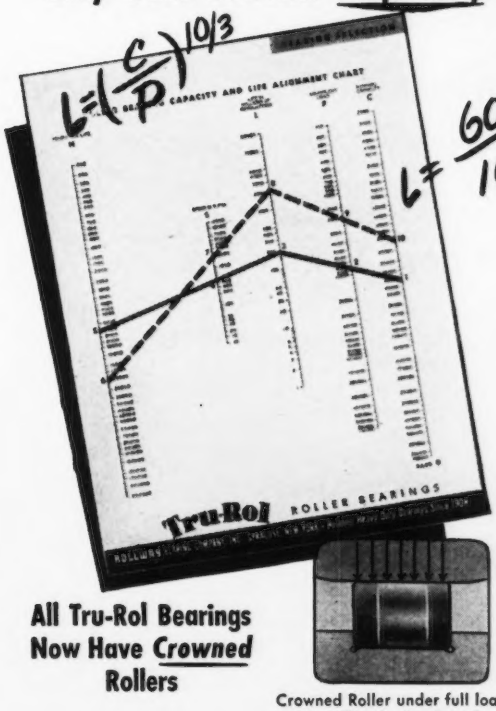
# New Catalog

FEATURING

**An accurate, simplified way to apply the RBEC* formula when selecting cylindrical Roller Bearings**




**Easy Quick Solution Graphically**




**All Tru-Rol Bearings Now Have *Crowned* Rollers**



Crowned Roller under full load — stress uniformly distributed.

**Hot off the press is Rollway's Tru-Rol Catalog presenting...**

### New Rollway Alignment Chart

Now, for the first time, RBEC* formula is converted into simple nomogram! Complicated selection procedure eliminated! Using this graphic method, simply draw two lines—and find in a matter of *seconds* the proper bearing for your application.

### Complete Description, Ratings, Dimensions

All the data you require on every size and type of Tru-Rol Roller Bearings. And here is introduced the new, exclusive quality mark in the Tru-Rol field—*Crowned* Rollers! Crowning eliminates end loading, produces uniform stress pattern along full length of roller, and extends bearing life.

**SEND FOR YOUR FREE COPY**

Included with Rollway's new 36-page catalog are extra copies of the new Alignment Chart. Mail coupon for yours today!

*Roller Bearing Engineers' Comm.—Anti-Friction Bearing Mfrs. Assn.

**ROLLWAY BEARINGS**

COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

**ROLLWAY BEARING CO., INC.**
**Syracuse 4, N. Y.**

Please send free copy of your new Tru-Rol Catalog with extra Alignment Charts.

Name..... Title .....

Firm Name.....

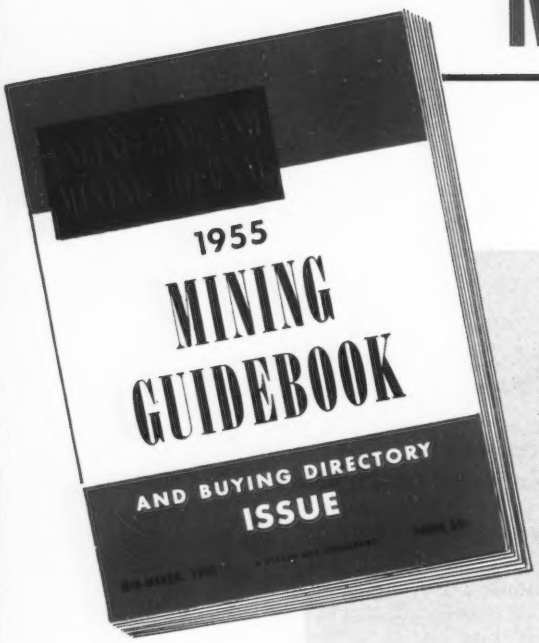
Address.....

City..... Zone..... State.....

**SALES OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto • Pittsburgh • Cleveland • Milwaukee • Seattle • Houston • Philadelphia • Los Angeles • San Francisco**

# ENGINEERING AND MINING JOURNAL

# Mining Guidebook




## *a new Engineering and*

## GENERAL INDEX

### ENGINEERING AND MINING JOURNAL

### Mining Guidebook and Buying Directory Issue

**1. Exploration**
Geophysical Methods
Geological Methods
Drilling and Sampling

**2. Underground Mining**
Planning Mining Methods
Mine Development
Drilling and Blasting
Loading
Hauling
Hoisting
Ground Support

**3. Open-Pit Mining**
Pit Planning
Drilling and Blasting
Earthmoving

**4. Milling, Concentrating**
Crushing
Grinding
Classification
Flotation
Magnetic Concentration
Other Concentration Methods
Mill Plant Design

**5. Metallurgy**
Pyrometallurgy
Chemical and Hydrometallurgy
Electrometallurgy

**6. General Mine Plant Operation**
Maintenance
Materials Handling
Power Distribution
Ventilation and Dust Control
Pumping and Drainage
Communications
Safety

**7. Buying Directory, Equipment, Services and Materials**

# in March will present the

# and Buying Directory issue

## *Mining Journal reader service*

## For the first time...

- A concentrated presentation of the newest significant techniques in exploration, mining, milling, concentrating, metallurgy and general mine plant operation.

- Practical Useful . Streamlined . . Quick information prepared by the editors of ENGINEERING AND MINING JOURNAL with the cooperation of authorities on the various phases of mining and the equipment and materials used in mining.

- A buying directory of the equipment, services and materials used by the mining industry . . in the same issue under the same cover.

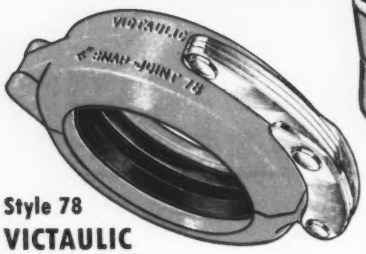
- A reference to all advertising pages in the product listing to help ENGINEERING AND MINING JOURNAL readers obtain more information on products or services.

- The E&MJ MINING GUIDEBOOK AND BUYING DIRECTORY issue will be mailed to ENGINEERING AND MINING JOURNAL subscribers, automatically, as a new additional subscriber service. Plan now to receive your personal copy in March.

# VICTAULIC
## METHOD OF PIPING

**FOR GROOVED PIPE**

Style 77 & 77-D



Style 78
**VICTAULIC SNAP-JOINT**

New, boltless coupling — hand-locks — for faster hook-ups with no loose parts. Ideal for temporary or permanent lines. Sizes 1", 1¼", 2", 3", 4".

**VICTAULIC COUPLINGS** Style 75

Style 77 & 77-D—The "general-purpose" couplings for standard applications. Simple, fast, reliable—sizes ¾" to 60".

Style 75—Light Weight Couplings—for low pressure, low external stress applications. Sizes 2", 3", 4".

**VIC-GROOVER TOOLS**

Handy, on-the-job grooving tools that do the work in half the time. Light weight, easy to handle, operate manually or from any power drive. Automatic groove position and depth. Sizes ¾" to 8".

**VICTAULIC FULL-FLOW FITTINGS**

Streamlined for top efficiency, easy to install—complete line, Elbows, Tees, Reducers, Laterals, etc., — fit all Victaulic Couplings. Sizes ¾" to 12".

**FOR PLAIN END PIPE**

Style 99
**VICTAULIC ROUST-A-BOUT COUPLINGS** Best engineered, most useful plain end joint on the market! Simple, fast, husky. Easy to install with any socket wrench. Takes strong, positive, bull-dog grip on pipe. Sizes 2" to 8".

Promptly available from distributor stocks coast-to-coast. Write for NEW Victaulic Catalog and Engineering Manual No. 54-8A.

**VICTAULIC COMPANY OF AMERICA**
P. O. Box 509 • Elizabeth, N. J.

EASIEST WAY TO MAKE ENDS MEET!


## Chile *(Continued)*

Lake Buenos Aires in southern Chile has arrived in Santiago for sale within the country.

This company began producing high-grade lead concentrates in 1950 but these have been exported mostly to Germany. In May of this year it began smelting part of its production of lead concentrates in a small Scotch hearth. Now it plans to install another and larger hearth to be in a position to reduce to pig lead the whole of its output of concentrates.

Chile consumes about 1200 tons of metallic lead a year, most of which Cia. Minera Aysen can produce from its own mines.

**During 1953 Chile exported to Western Germany 12,355 metric tons of blister copper from the Paipote smelter.** This copper is refined under a toll basis by the Norddeutsche Affinerie at Hamburg but the refined copper is sold by Paipote.

Trade between Chile and Western Germany has grown from nothing in 1946 to $45-million last year. Under present artificial conditions in the exchange rates, it is very difficult to export any ores or concentrates to the United States since the American dollar is pegged at 110 pesos while the German dollar has risen to double this value.

**Demand for ore above 60% iron from the United States has persisted steadily** for the last 2 yr but only two companies with sufficient capital have so far been formed: Santa Fe, which is exploiting the mine of the same name near the town of Ovalle and exporting the ores through the port of Coquimbo; and Santa Barbara, which will ship through Huasco.

Other possible producers in the near future will be Cia. Tarapaca y Antofagasta, a well-known nitrate producer, which has mines in Atacama, and Brown and Brown in Chanaral. Price paid per ton of 60% iron ore is $7 f.o.b. Chilean port with a sliding scale of from 15 to 18c per unit above 60% iron.

Chile possesses numerous iron deposits which extend from Ovalle in the south to Chanaral in the north but none of these has more than about 15-million tons of ore except the new Romeral mine belonging to Bethlehem and the Algarrobo which is owned by a Dutch company.

**The Mining Bank has been investigating possibilities of exploiting manganese deposits** in the Province of Coquimbo near the Camps of Lambert and Arqueros which have been previously worked.

**Draft of the agreement to be signed between the United States and Chilean Governments with regard to radioactive minerals** in this country has been sent to the U. S. Embassy in Santiago.

Some 3 yr ago, the AEC sent two of its geologists to this country to investigate the occurrence of uranium ores. Those mining camps where cobalt and silver ores were known to occur were first investigated in a preliminary survey.

The present Administration also proposes to send a bill to Congress to fix the conditions under which radioactive minerals can be exploited and sold.

**THE JOB...**

**Mine Shuttle Car Service**

**THE CABLE...**

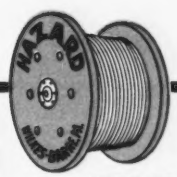
**Hazacord "Hex-Tite"**
**Twin Type G**

# USE THE CABLE THAT FITS THE JOB!

Toughness is an absolute requirement for long, uninterrupted service life in mining cables that are subjected to the severest of all operating conditions. Hazacord's Hazaprene ZBF sheath is designed to provide the greatest possible mechanical protection while maintaining the flexibility required by highly mobile equipment.

Hazard's new exclusive "Hex-Tite" construction prevents twisting of the insulation within the sheath, avoiding one of the most common causes of cable failure. In the Hex-Tite construction the insulation is hexagonally shaped, affording a twist-proof grip. Reinforcing cords woven over the insulation double lock the conductors in place. And the tough, flame-resistant Hazaprene ZBF sheath completely encases the conductors and holds them tight.

Your Hazard representative can furnish you with further details on Hazard mining cables or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.



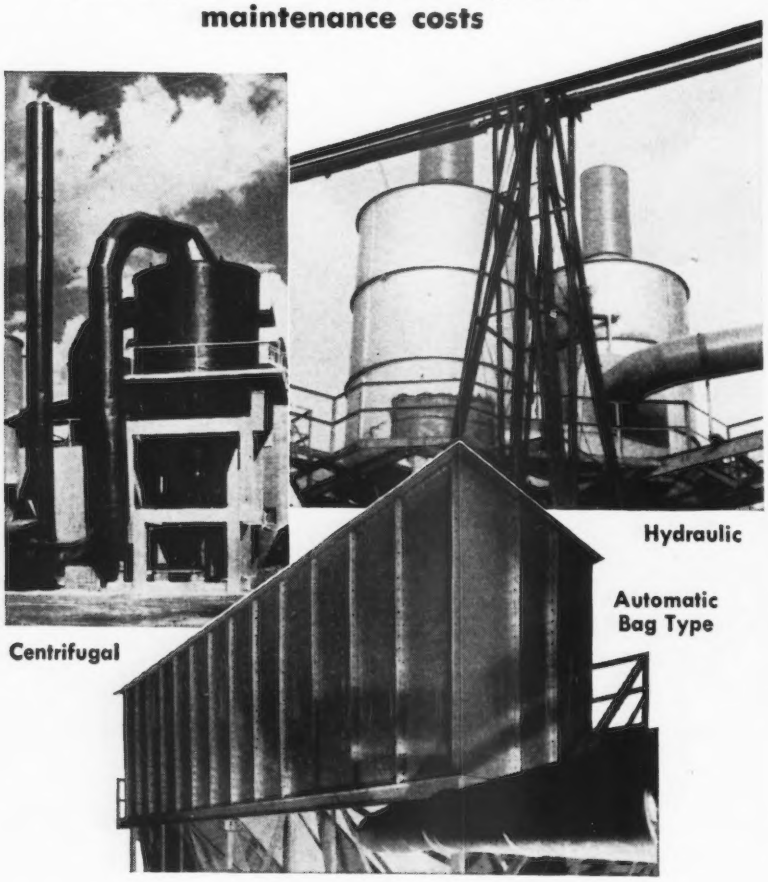

**HAZARD**
**insulated cables**

2136,

# Norblo

## Dust and Fume Collection Systems

**make outstanding records for high recovery with low operating and maintenance costs**



Centrifugal

Hydraulic

Automatic Bag Type

These three important types of Norblo collecting systems, frequently used in certain combinations, bring you economical, dependable control as required in a wide range of industries. "Guaranteed Efficiency" is not an empty phrase at Norblo. We stand back of every installation that's used for the purpose and at the capacity for which we designed it. All component parts are made by Norblo, under controlled specifications.

For more than 40 years Norblo has engineered and supplied installations of every size in the rock products, smelting, chemical, metal working, milling and processing fields. It pays you to get the facts about Norblo Dust and Fume Collecting Systems. Give us a description of your problems.

**The Northern Blower Company**

**Engineered Dust Collection Systems for All Industries**

**6410 Barberton Ave. OLympic 1-1300 Cleveland 2, Ohio**


## Chile *(Continued)*

**After an 87-day strike, miners and millmen of Compagnie Miniere du M' Zaita went back to work.** This French company owns two important mines and mills in central Chile; those of El Cobre and Cerrado having respectively a capacity of 550 and 150 metric tons per day. Conditions under which the men will work will be settled by arbitration.

**Production of gold in 1953 was 4065 kilos (130,000 oz)** against 5475 kilos (176,000 oz) in 1952.

This decrease is due in part to the fact that copper mining became more profitable than gold on account of the sustained high price of copper and the starting of the Paipote smelter which has made many miners shift from gold to copper mining.

Many small miners in Chile own copper and gold mines and exploit one or the other according to which metal is more profitable to work.

Mining claims in this country are held by the payment of yearly tax and not by doing a certain amount of work on the claim.

**After a strike which lasted 30 days,** the workers and white collar employees of the Braden Copper Co. returned to work on Sept. 20. It has been estimated that the loss of production caused by this strike reached $6-million and that the strikers themselves lost 60-million pesos in wages and salaries.

The unions were demanding raises that amounted to 75% of the wages they were receiving in spite of the fact that the Braden men are among the best paid in the country.

In order to compel the men to return to work, after all conciliatory means had failed, the Government threatened to draft the miners into the army. The conditions under which the men will work will be fixed by compulsory arbitration and the different camps of the company are now under military command.

As a consequence of the Braden strike, the men of Anaconda's Chuquicamata and Portrerillos mines also struck in sympathy for a few days, though the latter alleged that their strike was due to having to consume frozen meat 50% of the time.

Because of these strikes, it is certain that this year's production of copper will not reach the hoped for figure of 330,000 short tons. It is hoped that next year's output may reach 440,000 short tons.

Production is now estimated to approach between 12,000 and 13,000 tons per month with Braden going on a 7-day week schedule.

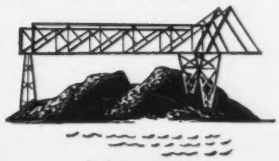
**Chilean Ministry of Economics has said that decreased copper production** will prevent Chile from meeting her international commitments. During the first six months of 1954, only 140,000 metric tons were delivered, the Ministry says, and even with full-scale production from now on, there is scarcely any chance of completing shipments of the 300,000 tons which were sold ahead for this year.

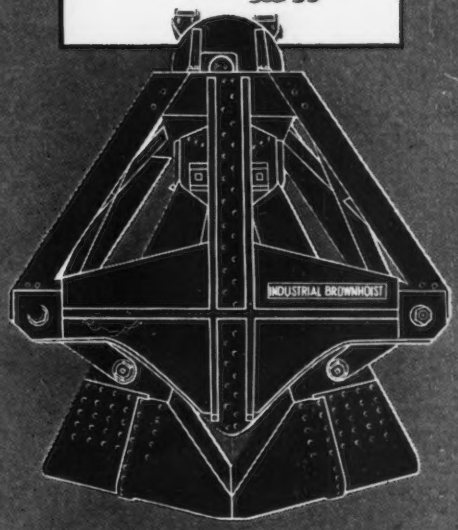
Last year's deliveries totaled 326,000 metric tons.

# BROWNHOIST

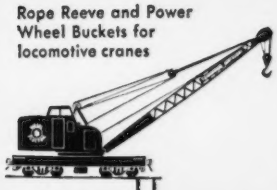
## ALSO BUILDS BETTER BUCKETS

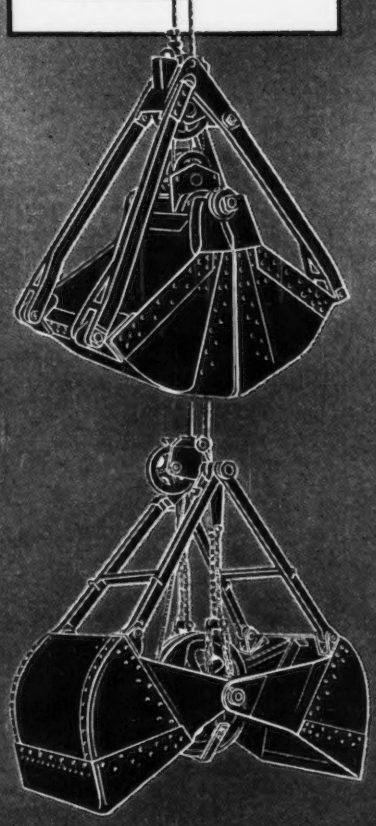
Link Type Buckets for boat unloaders, bridge cranes, fast plants






Rope Reeve and Power Wheel Buckets for locomotive cranes





Brownhoist Buckets are designed for specific jobs and especially engineered to meet the toughest materials handling requirements. They take deep, full capacity bites that move more materials per lift, thus making possible considerable savings in man-hours and production time. They are built for endurance and dependability, the same qualities that have accounted for Brownhoist leadership in the bulk materials handling field for more than three quarters of a century. Railroads, steel mills and dock operators who are loading and unloading coal, ore, slag or other bulk materials will find it pays to discuss their requirements with Brownhoist engineers.

164

## BROWNHOIST builds better cranes

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN • DISTRICT OFFICES New York, Philadelphia, Cleveland, Chicago, Denver, San Francisco, Montreal • AGENCIES Detroit, Birmingham, Houston

# LATTICE BRAID* Packing

## *outlasts* ordinary packings

## $3\frac{1}{2}$ to 1 on Mine "Pole" Pumps

*Registered Trademark. *Only* Garlock makes LATTICE BRAID rod and shaft packings.

Reciprocating "pole" pumps handling gritty water underground in an iron mine are subjected to unusually severe service. That's why a prominent Lake Superior district mining company decided to try LATTICE BRAID Packing on their pumps in a mine in northern Wisconsin. Previous packings had never lasted over one month. This large mine now reports that LATTICE BRAID lasts 3½ months *and* that it causes *less* wear on the "poles" (plungers) than any other packing used.

Put Garlock LATTICE BRAID Packing to work for your company. All the braided strands of this unique packing are lattice linked together into one structural unit. The strands hold together even when the packing is worn far beyond the limits of wear of ordinary braided packings.

LATTICE BRAID is made from flax, cotton, asbestos, wire-inserted asbestos, Teflon, and asbestos with Teflon impregnation—for various types of services.

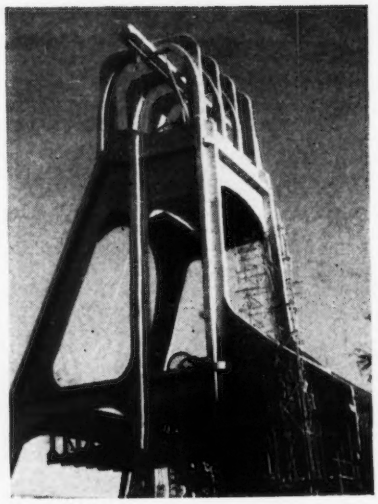
*Get all the facts about* LATTICE BRAID *Packings. Contact your Garlock representative or write for new folder AD-131.*

**THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK**

**Sales Offices and Warehouses:** Baltimore • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland Denver • Detroit • Houston • Los Angeles • New Orleans • New York City • Palmyra (N.Y.) • Philadelphia Pittsburgh • Portland (Oregon) • Salt Lake City • San Francisco • St. Louis • Seattle • Spokane • Tulsa.

**In Canada:** The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK LATTICE BRAID PACKING

**CONCRETE HEADFRAME** towers above the Margaret shaft of the Stilfontein Mine in the Western Transvaal. These concrete towers are replacing the conventional lattice-work headframes in South Africa.

## BRAZIL

**New coal field important to Brazil's iron and steel industry has been discovered in the coal district of Criciuma,** State of Santa Catarina, with an average depth of 60 meters. Called the "Pre-Bonito" field (because it lies below the "Bonito" field in that area), it is expected to yield a low-grade coal of from 35 to 46%. Reserves of recoverable coal deposits in the Bonito and Pre-Bonito fields are estimated at about 300-million tons.

## PERU

**Construction of a concentrator at an elevation of approximately 4500 meters** in the Province of Huarochiri, Department of Lima, to treat the silver, copper, lead and zinc ores of the region by flotation, is now completed. Built by the Mining Bank of Peru at a cost of around $130,000, capacity of the concentrator will be 70 tons of ore daily. Manufactured by the Denver Equipment Co., the machinery costing around $50,000, was imported by the International Machinery Co. In order to double the capacity of the plant an additional investment of $75,000 is being considered by the Mining Bank.

The new plant is located in a highly mineralized region, the development of which has been handicapped by the rugged topography and lack of transportation facilities. Construction was undertaken by the technical personnel of the Mining Bank, headed by Victor Rocha Revilla, mining engineer and former superintendent of the Ticapampa silver mines in the Department of Ancash who joined the staff of the Mining Bank four years ago.

## Operator's Pride Key to Low Shovel Maintenance

*by*
R. G. THIBAUT
*Service Manager, The Thew Shovel Co.*

The pride of the operator in his job and his machine is the real key to low shovel-crane maintenance cost. If the operator takes enough pride in his machine and his job to see that proper lubrication and servicing is done on a regular schedule, costly shut-downs and repairs can be avoided.

All manufacturers want their machines to get the best of care — want them to serve the contractor well and safely throughout a long and trouble-free life. To that end they publish operator's manuals with preventive maintenance, adjustment and lubrication instructions and proper operation procedures. However, no one but the operator, or the master mechanic, can see that these programs are carried out completely.

Easy-access grease fittings and simplified adjustments are provided to make this part of the operator's job easier. Permanent lifting capacities mounted in the cab make it easy to keep loads within safe limits. But, the operator himself is still the key to the problem, because he is the only one that can implement the planning that is done to assure trouble-free operation. If he really knows his machine, and maintains and services it as the factory recommends, and does not abuse it, operating and maintenance costs will be reduced to a minimum.

It is a standing joke that women do not read instructions on new equipment they buy such as washing machines, cleaners, etc. Service engineers can testify that some operators apparently never read their service manuals either — or if they do, they don't remember what they read — or don't care.

It all comes back to how much pride the operator has — in his job, in his machine, and in himself. That is what really gets the most out of a piece of equipment — at lowest operating cost.


(Advertisement)

LOOK AT THESE
LORAIN-50
PROFIT BOOSTERS

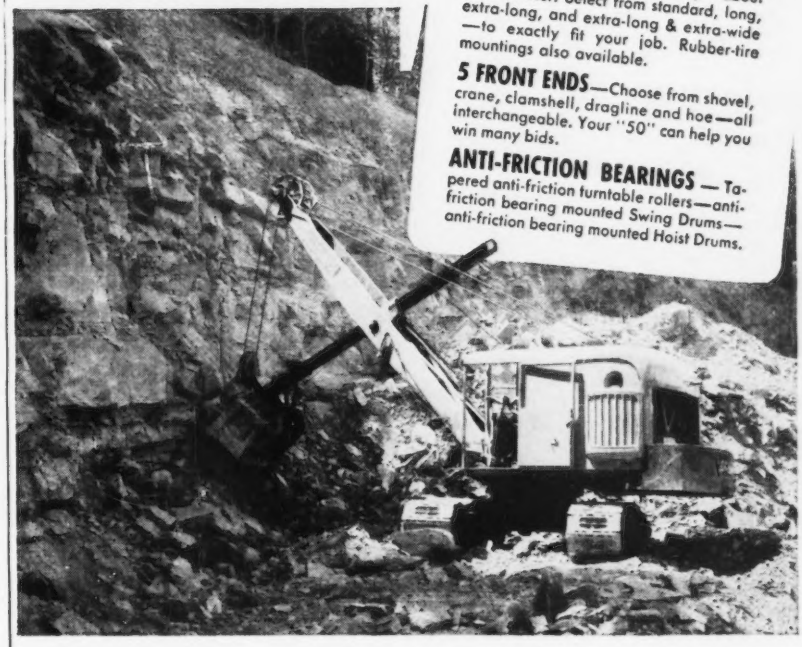
**HYDRAULIC COUPLING** — Prevents shocks and stresses from backing up into mechanism and cables—reduces maintenance—increases output. No stall under any digging condition. Standard on only this 1-yard machine.

**AIR CONTROLS** — Air does the work on the "50" — crawler steering and Tread-Travel Lock use full air power. Air-assist available on hoist, crawd and retract.

**4 CRAWLERS** — Be "choosy" about your crawler. Select from standard, long, extra-long, and extra-long & extra-wide —to exactly fit your job. Rubber-tire mountings also available.

**5 FRONT ENDS**—Choose from shovel, crane, clamshell, dragline and hoe—all interchangeable. Your "50" can help you win many bids.

**ANTI-FRICTION BEARINGS** — Tapered anti-friction turntable rollers—anti-friction bearing mounted Swing Drums—anti-friction bearing mounted Hoist Drums.



**Be "CHOOSY" when you buy a Shovel-Crane**

Times have changed! Today, you can get most *any* brand you want—when you want it. Not long ago, perhaps you bought just any make of shovel-crane "because it was available". Now you can return to *selective* buying to get the most for your money.

In the 1-yard Lorain-50 "Series" shovel-crane class, as well as in the rest of the wide Lorain line, there are solid values and exclusive design features that pay off in profits. They are not just "gimmicks" to confuse the buyer—but are an honest-to-goodness combination of values that you won't find in any other 1-yard class machine.

Be *"choosy"*. Make sure your shovel-crane investment will pay you greatest profits. Choose from the complete Lorain line —from ½ to 2-yard classes—at your Thew-Lorain Distributor.

THE THEW SHOVEL CO., LORAIN, OHIO

THEW LORAIN®

SHOVELS • CRANES • CLAMSHELLS • DRAGLINES • HOES

## Peru *(Continued)*

**Fluor Peruana S.A., wholly-owned subsidiary of the Fluor Corp.,** is planning the erection of a sulphur refinery plant in Peru's Tacna Department and the renewed development of old Tutupaca and other sulphur deposits in that region.

Preliminary plans call for pilot plant followed by a mill with 100 tons daily capacity.

If test operations are favorable a $600,000 to $800,000 investment is contemplated in plant, access road and other developments.

## BRITISH GUIANA

**Heavy high grade deposits of columbite** have been discovered in the Upper Barama River in the northwest district of British Guiana, according to the director of the Geological Survey Department here. He said it had been proved that the mineral ran in a belt and was distributed over a wide area. Other known columbite areas are Morabisci, Robello, Kudabari, Upper Puruni, the mouth of the River Potaro and Kwakwani.

# IN ASIA

## INDIA

**Three Russian technicians now are mining for industrial diamonds in north central India,** as part of an agreement between an Indian mining company and the Soviet Government.

The Indian principals—the Panna Diamond Co. of Vindhya Pradesh—have asked for equipment and technical know-how against a share in any profits that may accrue. Russia has suggested straight payment for equipment and a loan of technicians.

This is the first time that Russian mining experts have come to work in India and their project is seen here as part of the current Soviet attempt to establish an industrial bridgehead in India.

But on Sept. 27 in the Indian Parliament Deputy Minister for Natural Resources and Scientific Research, K. D. Malaviya, said that India did "not encourage non-Indians to take up mining leases where the work did not require any great specialist work."

He added that the Orissa (North-East India) Government had been advised to turn down a non-Indian's application for a mining lease.

## JAPAN

**Export contracts concluded by Japanese smelters and rolling mills** since early September total 14,050 metric tons, according to a spokesman of the Nihon Mining Company, Japan's largest copper producer. Electrolytic copper accounted for 6750 tons of this total; electric wire


WEIGH IT ON THE GO!

Builders Conveyoflo—the modern conveyor meter — totalizes the weight of dry material passing over conveyor belts. Continuous, automatic, extremely accurate — Conveyoflo is installed right in your present conveyor, or can be furnished as a separate, self-powered conveyor and scale unit. Capacity is limited only by the capacity of the conveyor belt itself.

EXCLUSIVE FEATURES

- Accurate . . . within ± ½ of 1% of actual weight from maximum to 50% of meter's rated capacity; within 1% from 50% to 25% rate; within 2% from 25% to 10% of rated capacity.
- Automatic totalizer compensation for variations in belt speed and changes in belt weight.
- Responds accurately to rapid load variations.
- Paces auxiliary equipment (feeders, controllers, continuous blending processes, etc.) and operates secondary instruments.

Write for Bulletin 550-H4. Builders-Providence, Inc. (Division of B-I-F Industries, Inc.), 391 Harris Avenue, Providence 1, Rhode Island.

BUILDERS-PROVIDENCE
DIVISION OF B-I-F INDUSTRIES, INC.
METERS FEEDERS CONTROLS

FLEXCO®

BELT FASTENERS and RIP PLATES

FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.
★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO., 4635 Lexington St., Chicago 44, Ill.

GENERAL CABLE

# THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE

## New SUPER SERVICE

### heavy duty cords and cables

GREATER CRUSH RESISTANCE

GREATER CUTTING RESISTANCE

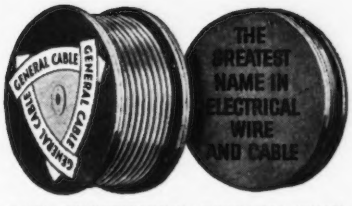
## CHECK THESE MONEY-SAVING FEATURES...

Every type in the completely new line of **SUPER SERVICE** resists impact, crushing and cutting far beyond accepted field requirements. Special cord reinforcement provides vital extra tensile strength and increases wear. **SUPER SERVICE** needs less replacement...costs no more! Look at these money-saving features:

SUPERTUF—General Cable's new mold cured jacket—is free from ply separation, resists tearing and abrasion. New, more compact design prevents sleeving of the jacket from the core. Flame resistance far exceeds requirements of the Federal Bureau of Mines. New **SUPER SERVICE** meets all IPCEA specifications.

THERMAX heat resistant insulation, another **SUPER SERVICE** improvement, provides top protection against temporary current overloads and extends the operating life of the cable.

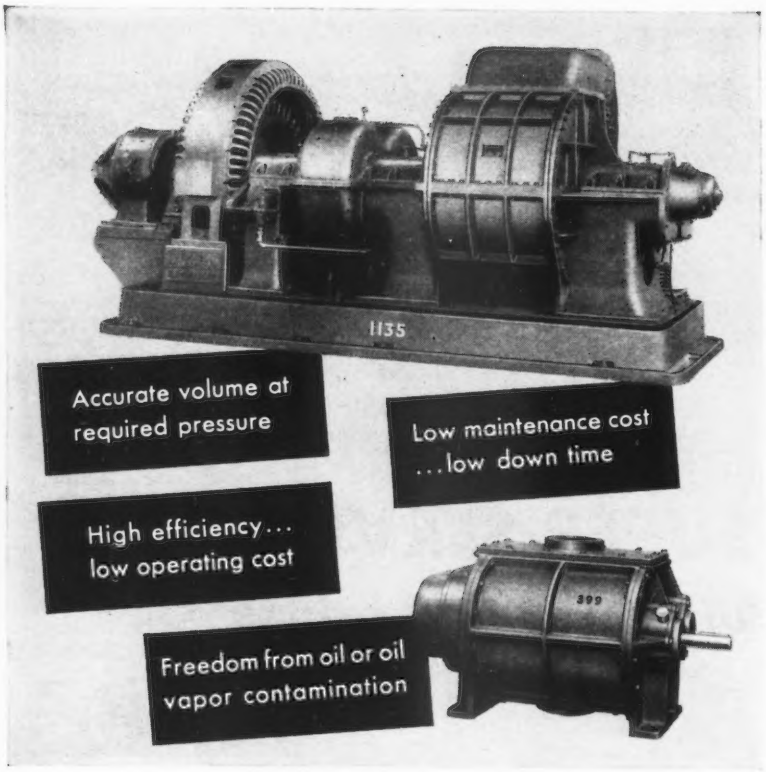
Result: a well balanced product that performs better, lasts longer...costs no more! Why settle for less! Remember— General Cable is the only manufacturer able to fill *all* your wire and cable needs. It pays to buy in one place!




BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

## GENERAL CABLE CORPORATION

420 Lexington Ave., New York 17, N. Y. • Sales Offices: Atlanta • Boston • Buffalo • Chicago Cincinnati • Cleveland • Dallas • Denver • Detroit • Erie (Pa.) • Greensboro (N. C.) • Houston Indianapolis • Kansas City • Los Angeles • Memphis • Milwaukee • Minneapolis • New York Newark (N. J.) • Philadelphia • Pittsburgh • Portland (Ore.) • Richmond (Va.) • Rochester (N. Y.) • Rome (N. Y.) • St. Louis • San Francisco • Seattle • Syracuse • Tulsa • Wash., D. C.


Accurate volume at required pressure
Low maintenance cost ...low down time
High efficiency... low operating cost
Freedom from oil or oil vapor contamination

LOOK FOR THE "BIG 4"

WHEN YOU BUY BLOWERS

Successful over-all performance of blowers calls for continuous, long-time ability to meet these basic requirements. In any specific case, one may be more important than another. But, when you select Roots-Connersville equipment, you sacrifice none of these four essentials. That is true, whether your requirements are for a whisper of air or for a tornado. You'll find the R-C range of capacities so extensive that you can very closely match your needs, with resulting economies in both first cost and operating cost. Further, you have the choice of either Rotary Positive or Centrifugal Blowers, from the exclusive R-C *dual-ability* line.

The ability to deliver blowers with these fundamental values comes from our century of specializing in problems of handling gas and air. The proof of this ability is readily found in our list of long-time customers who have gained complete satisfaction by entrusting their blower problems to Roots-Connersville. Ask us about your present or future needs in equipment to handle gas or air.

ROOTS-CONNERSVILLE BLOWER

Reg. U.S. Pat. Off.

A DIVISION OF DRESSER INDUSTRIES, INC.
1154 Washington Ave. • Connersville, Ind.

*Specialists in handling gas and air*

## Japan *(Continued)*

for 5950 tons and rolled copper and brass products for 1350 tons.

The export contracts for Electrolytic copper included 2320 tons to France, 1500 tons to India, 1500 tons to the Netherlands, 860 tons to West Germany and 40 tons to Egypt.

## MALAYA

**Yawata Iron & Steel Co., a Japanese concern,** has contracted to buy the entire output of iron ore from the Sre Medan Mine in Johore, Malaya.

The mine is currently producing at an estimated rate of 120,000 tons annually; it is planned to increase output to between 20,000 and 30,000 tons a month.

The director of Malayan Miners Co. Ltd., of Singapore, which owns the mine, said that negotiations with Yawata on price were expected to be concluded shortly. Actual exports would begin some time early next year.

**Quantities of workable tin may be found in the coastal areas near Kuala Selangor,** according to a report issued by the Federation of Malaya Geological Survey Department. The tin would, however, be low-grade and need dredging to be extracted.

The report states that the production of tin ore from the area will probably return about 100,000 piculs a year.

The tin industry in the district will depend on the successful mining of increasingly low-grade deposits in the future, the report says.

**Aluminum ore deposits which may be extensive enough to repay mining** have been located in the Batang Berjuntai area of Malaya, according to a report issued by the Federation of Malaya Geological Survey Department.

Of two deposits found, one was too small to be of economic importance but the other extended over 6 mi. This had not been fully explored, however. The report said the bauxite appeared to contain much shale.

# IN THE PHILIPPINES

**The Philippine government has created a board to implement the recently-enacted gold subsidy law.** Its duties will be to classify gold producers and determine how subsidized gold is to be sold to the Central Bank.

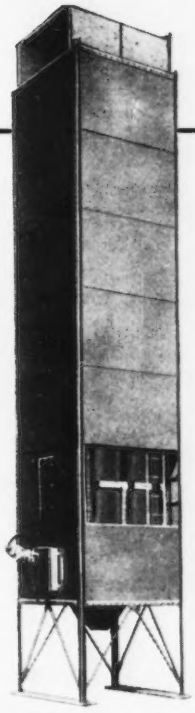
**Mindanao Mother Lode is prospecting vigorously to locate a property for development** to replace its worked-out mine in Surigao. It has recently optioned a copper property in Zambales with favorable indications. Larry Smith is in charge of the work.

**Sulu Minerals is operating a copper property at Port Languyan,** Tawitawi, in Sulu. Funds are being raised for expan-

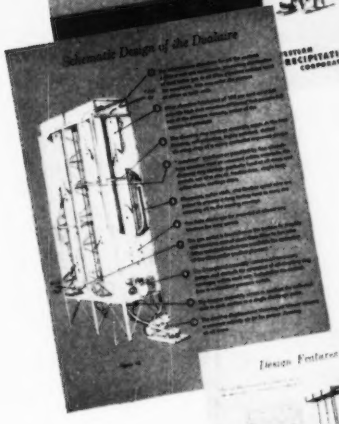
# The latest advancement in dust recovery

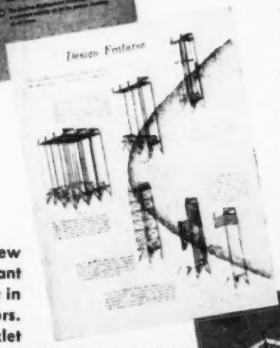
# Dualaire*

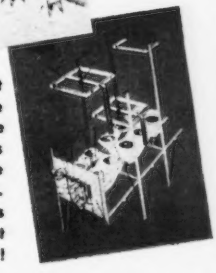
## REVERSE-JET DUST COLLECTOR!



- *Cleans without jarring or rapping!*
- *Maintains uniformly low pressure drop!*
- *Field-proven efficiency as high as 99.99%!*







Backed by the same organization that pioneered commercial application of COTTRELL Precipitators and MULTICLONE Collectors, the DUALAIRE Reverse-Jet Dust Collector is revolutionizing filter-type recovery systems. The DUALAIRE gives you vital advantages like these . . .

**REVERSE-JET CLEANING ACTION** cleans the filter tube continuously in small increments—not with sudden surges as in rapping or jarring.

**CLEANING ACTION** starts automatically and stops automatically to keep pressure differential within low pre-set range.

**FILTER EFFICIENCY** remains uniformly high at all times because no thick filter cake ever forms to reduce operation effectiveness. Actual field tests show efficiencies as high as 99.99%!

**NO STANDBY UNITS,** with their complicated switching devices, are needed. The DUALAIRE is cleaned as it filters—without interruptions or shut down periods for cleaning. The operation is continuous!

**FILTER UNITS LAST LONGER** because they are not subjected to intermittent jarring, rapping or vibration—all destructive to filter fabrics.

**The above are only a few of the many important advantages you get in DUALAIRE Dust Collectors. This 12 page booklet gives the full story . . . explains how reverse-jet cleaning action works — shows how the basic DUALAIRE unit is adaptable to a wide range of operating requirements — provides facts, figures and illustrations that will change your thinking on filter-type recovery systems. Send for your free copy of this descriptive booklet — or see your nearest Western Precipitation representative!**

WESTERN Precipitation CORPORATION

DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

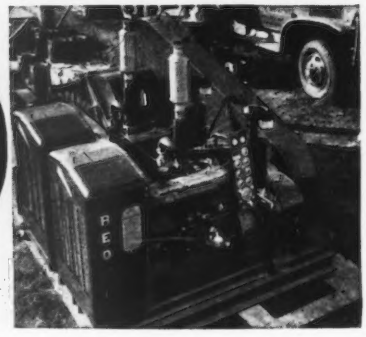
*Main Offices:* 1012 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 N. La SALLE ST. BLDG., CHICAGO 2
1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

*"Dualaire" & "Multiclone" ®

Licensed by H. J. Hersey, Jr.

STOP!
TOO FREQUENT SHUTDOWNS
*Buy* WIRE SCREENS THAT
SERVE LONGER — STAY STRONGER
CLEVELAND
WIRE SCREENS
... maintain rigid accuracy of openings.
... provide longer productive service.
... are accurately woven of tough, yet ductile abrasion-resistant steel.
... increase your profits.
Send us your job requirements — our specialists are at your service.
THE CLEVELAND WIRE CLOTH & MFG. CO.
3576 E. 79 STREET · CLEVELAND 5, OHIO

REO
INDUSTRIAL ENGINES



*Merit Your Confidence*

REO—one of the world's leading engine builders—has now applied to industrial power the same foresight and experience which developed the world's most modern truck engine.

On all 50-180 continuous horsepower services—operating on gasoline, liquefied petroleum gas, or natural gas—these dependable spark-ignition REOs deliver (1) high horsepower to displacement and weight; (2) low-cost operating efficiency, (3) long service life, (4) easy maintenance, (5) simplified major repairs.

Get all the money-saving facts about the many REO heavy-duty features and low operating costs. Write for specifications and name of nearest dealer.

INDUSTRIAL AND MARINE ENGINE DIVISION
REO MOTORS, INC., LANSING 20, MICH

## Philippines (*Continued*)

sion and development. R. H. Johnson is president and general manager.

**Besides the Acoje Mining Co., whose output in the first half of 1954** came to 36,825 tons of metallurgical grade chromite, three other smaller producers reported 4230 tons for the same period. The total value of the metallurgical chromite shipped was $1,146,000 in the first six months.

**Construction work at the Toledo Copper Mine in Cebu is being completed at a fast rate,** with indication that milling at the 4000-ton plant will begin by the end of the year.

According to ore dressing tests made by the company, about 167 tons of copper concentrates and 250 tons of pyrites per day will be produced. Tests indicate the copper concentrates will run 24-27% copper, with an 87% recovery.

Cost of bringing the mine into production estimated at 7.5-million pesos.

This low cost was attained because practically all the machinery for the mill was obtained from the pre-war mills of Masbate, IXL, and Antamok Goldfields, which have been merged into the present Atlas Consolidated M & D Corp., which controls the Toledo mine.

Roscoe Cannon is general manager of Toledo, Clarence Weekly, chief metallurgist, and George Scholey, chief engineer.

# IN SCANDINAVIA

## DENMARK

**The state-owned cryolite company** on Greenland has begun extensive investigations to find new ore veins and to determine if cryolite of lower quality in the old mines can be worked into first-class material, using modern methods.

The cryolite findings at Ivigtut on southern Greenland are expected to be exhausted within 10 yr.

Export of cleaned cryolite from the factory in Copenhagen amounts to over $4-million a year. Besides this, about 12,000 pounds of cryolite are exported directly from Ivigtut to Philadelphia.

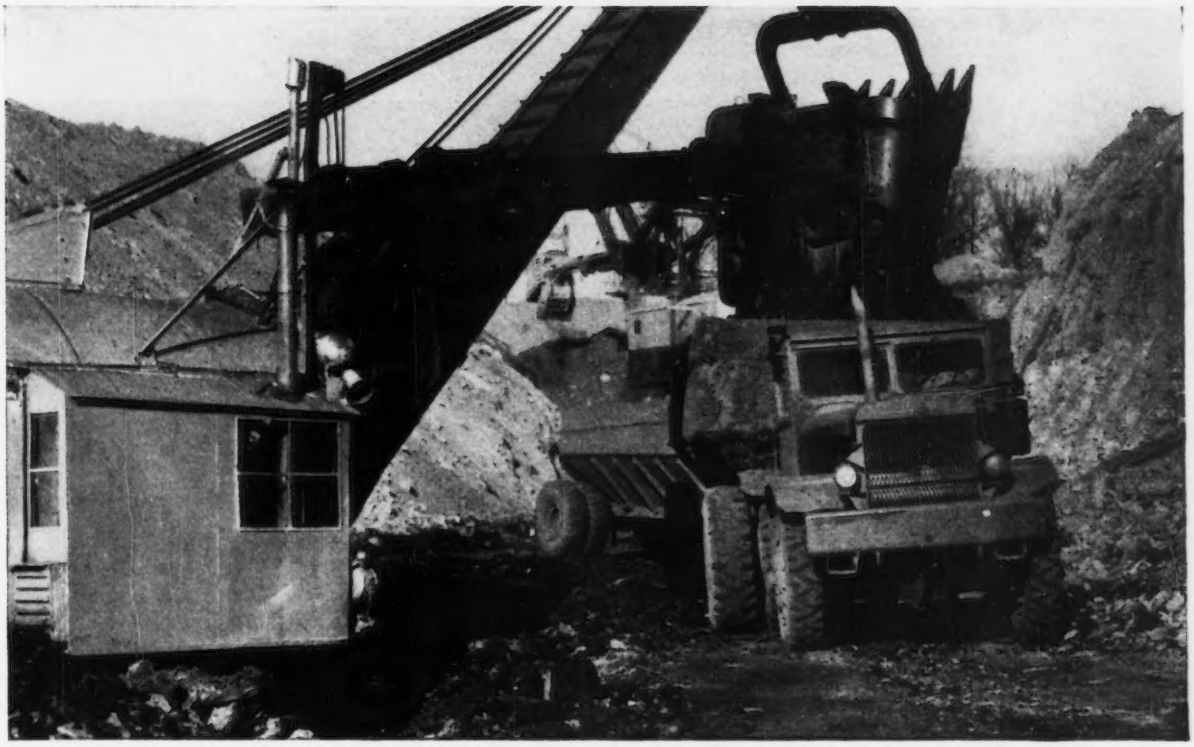
## NORWAY

**First cargo of aluminum produced at the new aluminum works plant at Sunndalsora** left Oslo in September on a Russian ship bound for USSR. Cargo totals about 1000 tons.

Production at the plant, which began operating in June 1954, is about 13,000 tons a year. When a nearby hydroelectric plant has been finished, production will be raised to nearly 40,000 tons a year.

Most of the aluminum produced in Sunndalsora will be sold on the European market at first. In 1955 exports to USA will begin to amortize a U. S. loan made for building the plant.

# B.F.Goodrich



## "We prefer the Universal tread over any other," mine superintendent says

HOUR after hour, Roy J. Ault, superintendent of the Shasta Coal Corporation strip mine at Bicknell, Ind., sees giant tractor-trailers haul 32-ton loads of coal up out of the mine. B. F. Goodrich Universal tires work so well on rock-covered roads that Ault says they are preferred over other makes.

The Universal tread is specially compounded to resist rock cuts and bruises. Wedge-shaped cleats defy dangerous skidding and sliding.

### All-Nylon cord body

B. F. Goodrich Universal tires have an *all-nylon* cord body. Nylon is stronger than ordinary cord materials, withstands double the impact. All-nylon Universal tires outwear the tread, *can still be recapped over and over!*

Under the tread is the B. F. Goodrich nylon shock shield. Layers of strong nylon cords stretch together under impact to protect the tire body. Result: Universal tires wear longer; more tires can be recapped.

See all-nylon Universal tires (size 12.00 and larger—smaller sizes in rayon or nylon) at your B. F. Goodrich retailer's. The address is listed under Tires in the Yellow Pages of your phone book. Or write *The B.F.Goodrich Co., Tire & Equipment Division, Akron 18, Ohio.*

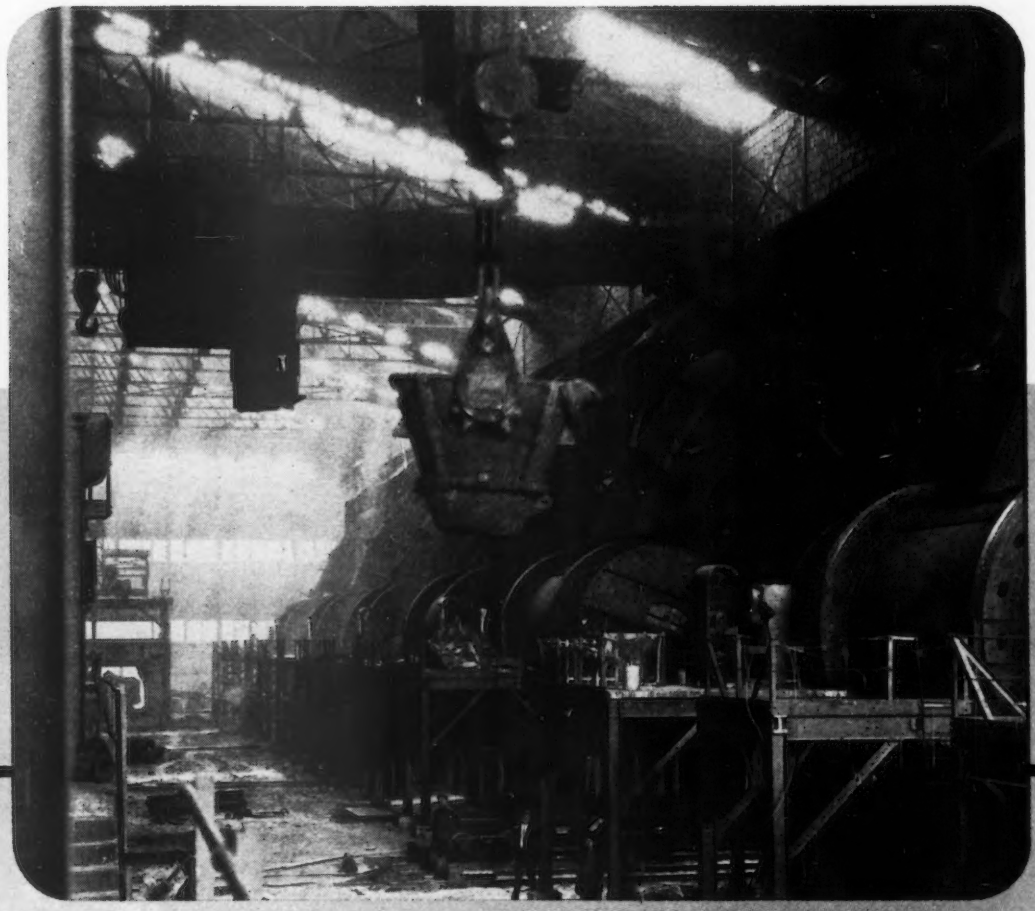
**Specify B. F. Goodrich tires when ordering new equipment**

**EN ROUTE TO THE TIPPLE** B. F. Goodrich tires "hold the road better", Shasta Coal Corp. reports.

**UNIVERSAL TIRES** are non-directional, can be mounted in any wheel position. You need fewer spares.

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

# for copper converter linings . .



These carefully controlled refractories are made from the best quality raw materials, are formed under high pressure and are fired extremely hard. Dependable workmanship and uniformity are assured.

In addition, Harbison-Walker produces various other classes of basic refractories for every metallurgical furnace need.

®

# HARBISON-WALKER

## provides Two service-proved basic refractories

### • Chromex B

Briefly summarized, the desirable properties which account for the excellent service secured with this extra hard fired chrome-magnesite refractory are:—high density and impermeability—relatively low thermal expansion and good resistance to thermal shock—unusual stability and high strength at high temperatures.

### • H-W Magnesite

For the most strongly basic linings this refractory, consisting predominantly of periclase (stabilized crystalline magnesia), fulfills the most severe requirements. It is fired at an extremely high temperature and is dense, strong and volume stable at temperatures far above the highest employed in copper converters.

**HARBISON-WALKER REFRACTORIES COMPANY**

AND SUBSIDIARIES

*General Offices: Pittsburgh 22, Pennsylvania*

**World's Largest Producer of Refractories**

ready for diamond drilling **anywhere**

1. Jeep mounted, self-contained unit.
2. Power take-off drive (for Jeep or small truck).
3. 3 speed transmission.
4. Cargo type cathead winch.
5. Water swivel.
6. Built in water pump with separate clutch.
7. Acker exclusive screw feed design.
8. Rugged steel chuck with extra long jaws.
9. Two stabilizing jacks.
10. Tubular steel derrick.
11. Uses any standard diamond drill tools and bits.
12. Maximum depth 500 feet—E size tools.

**The New Model TS Acker Screw Feed Diamond Bit Drill**

Here's the latest Acker Time-saving screw feed diamond drill. Ready for action anywhere a Jeep can go. The entire unit is self-contained with power take-off directly from a Jeep or small truck. The extreme portability of Jeep mounting speeds diamond drilling over the roughest terrain.

You save valuable setting up and dismantling time and labor because this Acker is ready to drill the minute it arrives.

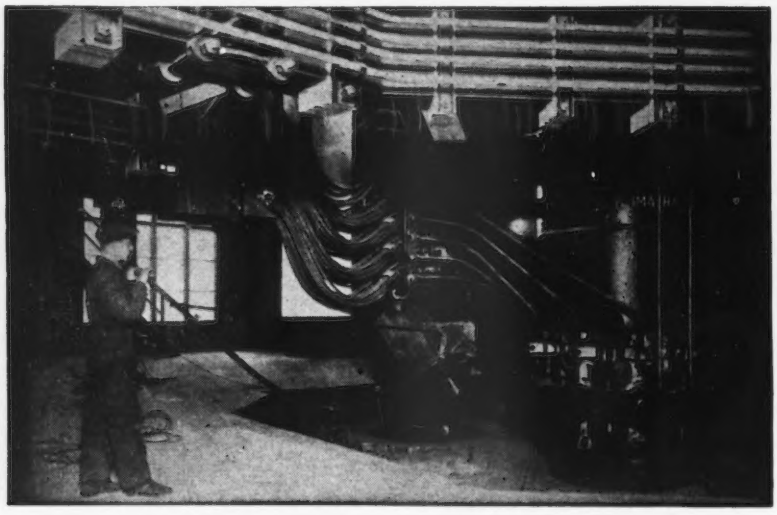
Think of ACKER for diamond core drills and accessories.

Write today for Bulletin EMJ

**ACKER DRILL CO., Inc.** 725 W. Lackawanna Avenue Scranton, Penna.

*Manufacturers of a complete line of Diamond and Shot Core Drills, Drilling Accessories and Equipment*





Elkem **ELECTRIC SMELTING FURNACES**

*The Soderberg Electrode System*

**Metallurgical plant design and erection**

**ELEKTROKEMISK A.S.**

*WRITE FOR CATALOG* **101 PARK AVENUE, NEW YORK 17, NEW YORK**

**(HEAD OFFICE: OSLO, NORWAY)**


# IN THE NEAR EAST

## ISRAEL

**Solel Boneh Ltd. of Haifa—a Labor-Federation-owned trust of 77 industrial enterprises**—is now planning the erec tion of a furnace with a capacity of 60 000 tons of iron per annum.

Ministry of Developments which sponsors the initiative has contacted Manufacturers' Associations—an organization embracing the private sector—to request the cooperation and participation of private enterprise possibly on a 50/50 basis.

Raw materials to be used: Galilee iron ores with 26-28% contents and ashes remaining after the production of sulphuric acid from pyrites imported by "Fertilizers & Chemicals" of Haifa Ltd. (contents 60% iron).

## TURKEY

**Wolfram ore deposits have been found in the neighborhood of Uluda,** according to Ankara Radio. The report said Canadian specialists had stated that the deposits were the richest in the world and that several foreign firms already had asked for the right to exploit them.

**Rich uranium deposits** have been reported discovered in the Province of Siva, Central Turkey. Experts say the quality is first class.

**Plans for a second iron and steel works at Edremit, on the Aegean coast** are under way. A group of German companies will soon begin study in the area, known for its large iron ore deposits. Another report from the area says that plans are moving for an electrolytic copper refining plant.

# IN EUROPE

## BELGIUM

**According to a recent agreement between the governments of Belgium and Switzerland,** Belgium will supply Switzerland with 10 tons of uranium ore.

The uranium will be mined by the Union Miniere du Haut Katanga, a Belgian mining company, located in the ore-rich Belgian Congo, and the ore will come from the southeastern section of Belgian's African Colony. The ore is to be processed in Great Britain, before being delivered to Switzerland.

According to Swiss reports, a special reactor will be constructed in Switzerland, to be used solely for scientific research. As part of the agreement, Belgium has announced that technical information will be exchanged with Switzerland.

# 600 TONS PER HOUR

## is a tough test - even for

# the Best!

Upper photo shows Alcoa's 42" x 36" Homer Hercules extra-heavy duty permanent magnetic pulley installation, one of the world's largest. This Homer pulley drives the 200' long, 20% troughed slope conveyor, which travels 300 feet per minute, moving bauxite ore at the rate of 600 tons per hour. Slope on the conveyor is 3⅛' per 12' length. This is one of nine Homer magnetic conveyor units installed in this plant.

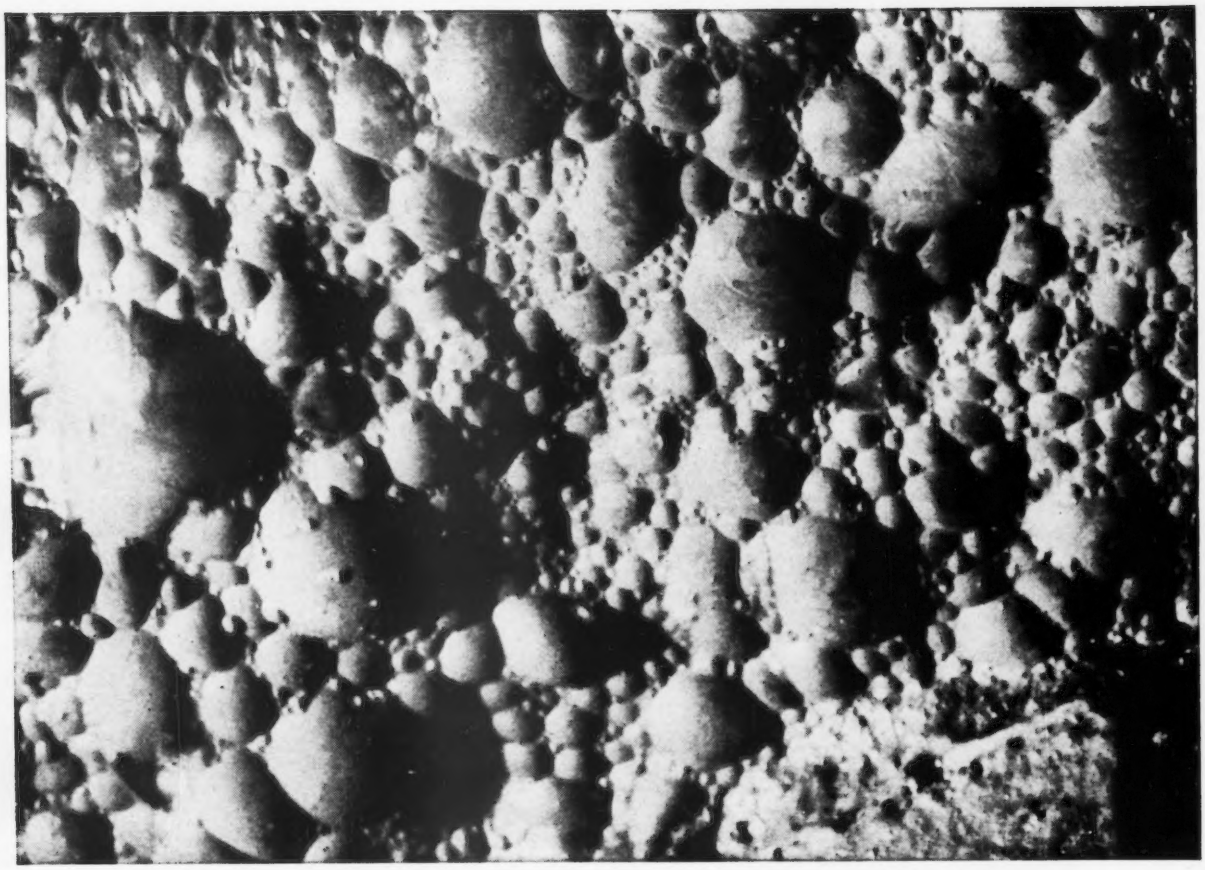
Like ALCOA–HOMER is interested in offering industry only the finest. Homer permanent magnetic separators have proved their ability time after time to perform effectively and efficiently, far beyond normal requirements.

Homer permanent magnetic pulleys and Homer cross belt magnetic separators are pacing Alcoa's tough conveying and automatic tramp iron removal jobs at their Mobile, Alabama plant.

If you are planning to use automatic magnetic separation equipment, it will pay to get the facts on Homer Magnetic Separators . . . the separators designed and built to give years of profitable service under unusual and extreme conditions. Let HOMER help solve your tramp iron problems–write us today.

**THE HOMER MANUFACTURING CO., INC., DEPT. 170, LIMA, OHIO**

HOMER . . . *the FINEST in Permanent Magnetic Equipment for Industry*



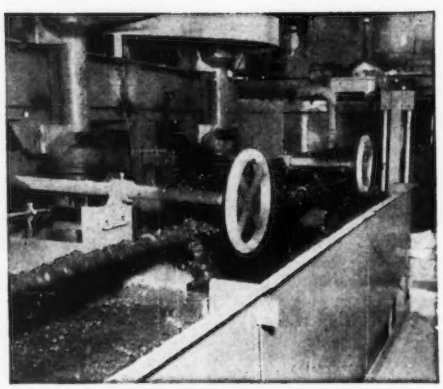
# FOR MAXIMUM RECOVERY AT MINIMUM COST

List the characteristics of a good flotation agent and you'll see why Hercules Yarmor® F Pine Oil has remained a standard of quality for more than thirty years. Economy, strong froth with good volume, satisfactory texture, excellent cell-life stability—Yarmor F Pine Oil has them all.

Widely used as a frother for sulfide minerals such as zinc, copper, nickel, iron and lead sulfides, Yarmor F Pine Oil has also shown excellent results in the recovery of gold ores and native metals. This low-cost frother is also ideal for use in the benefication of nonsulfide ores such as coal, mica, quartz, graphite, feldspar, phosphate rock, and talc.

Other Hercules' flotation agents include Hercules Rosin Amine D Acetate, a siliceous mineral collector that is particularly suited for the phosphates. For information on these and other Hercules flotation agents, write:

*Naval Stores Department*
**HERCULES POWDER COMPANY**
INCORPORATED
*933 King Street, Wilmington 99, Delaware*



**COAL FLOTATION**—A growing market for Yarmor is in the recovery of fine anthracite and bituminous from silt.

**HERCULES FLOTATION AGENTS**

BM54-1

# two-way side dumping eliminates truck tie-ups ... keeps rock production high

Assurance of constant, smooth flow of rock from quarry to crusher and elimination of costly truck delays have been achieved by Buffalo Crushed Stone Co. of Bowmansville, N. Y. through a flexible system of two-way side dumping at the crusher.

The greater flexibility of this system was achieved by converting from single truck units to truck-trailer combinations—thus doubling payload capacity for stepped-up production. Since all the dump bodies are designed for two-way dumping, the trucks can roll in on either side of the crusher. Remote-control overhead dumping system enables one man to control the feeding rate and the crusher operation. Feed is uniform...truck delay is eliminated.

Each of the six trucks hauls 28 tons in two side-dump bodies; 14 tons on the truck and 14 on the trailer. They handle grades up to 10% and roll at speeds up to 27 m.p.h. on the level. Each truck makes 22 trips daily between the quarry and the crusher, hauling a total of 3700 tons and using only 1.2 gallons of diesel fuel per hour per truck.

In switching to tandem operation, Buffalo Crushed Stone Co. knew they had a job calling for trucks that "have what it takes." Result: They bought Macks—six Model B-61 six-wheelers powered by Mack Thermodyne® Diesels, and equipped with heavy-duty Mack transmissions to meet stiff grade requirements.

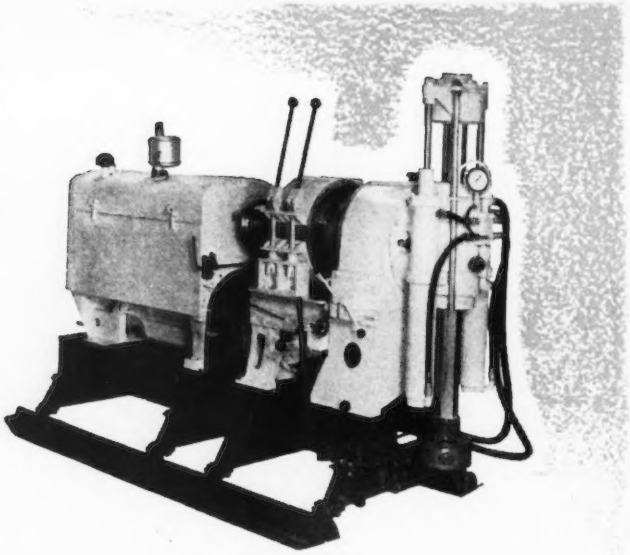
On your job, too, Mack trucks can make the big difference by hauling more—for less.

2716

**MACK TRUCKS** Empire State Building, New York 1, N. Y.

THE GREAT NEW

# Longyear 44



Here's a new diamond core drill,
built to give outstanding drilling performance at remarkably low cost.
The Longyear "44" is a *drill-runner's drill!* Its design is a result of recommendations from diamond drilling men all over the world.

## CHECK THESE FEATURES FOR SIMPLE OPERATION AND HIGH EFFICIENCY:

- **Capacity**—3000-4000 feet of "A" rods.
- **Heavy Duty Hoist**—a 13" drum provides extra capacity, uses planetary gears, will spool rope properly.
- **Oversize Brake Bands**—metallic linings assure safe and rapid handling of drill rods at depth.
- **Choice of Motive Power**—wide selection of gasoline, Diesel, electric or air.
- **Low Center of Gravity**—no danger of tipping over when moving from hole to hole.
- **New Swivel Head**—handles all sizes of rods, including 2-⅞" flush-coupled; Longyear Wire Line; and the newly adopted world standards.
- **Three-Jaw Safety Chuck**—permits use of 3-fluted Kelly for deeper holes.
- **Mounting**—available on a skid frame, or on a truck or trailer mounting.

Controls are centrally located for instant command of operation. Lubrication fittings are easily accessible for servicing. Gears are of finer pitch, to reduce drilling noise. Rugged construction assures long life and excellent service. In short, nothing has been overlooked to provide simple and efficient operation at the lowest possible cost to you.

The Longyear "44" is ready for your job. Send for Bulletin 90 to get full details and specifications.

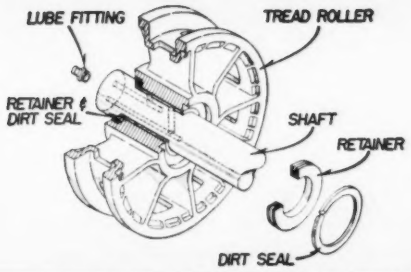
*An efficient contract drilling service is available to you at low cost.*

In U. S. A.
E. J. LONGYEAR COMPANY
Minneapolis 2, Minn.

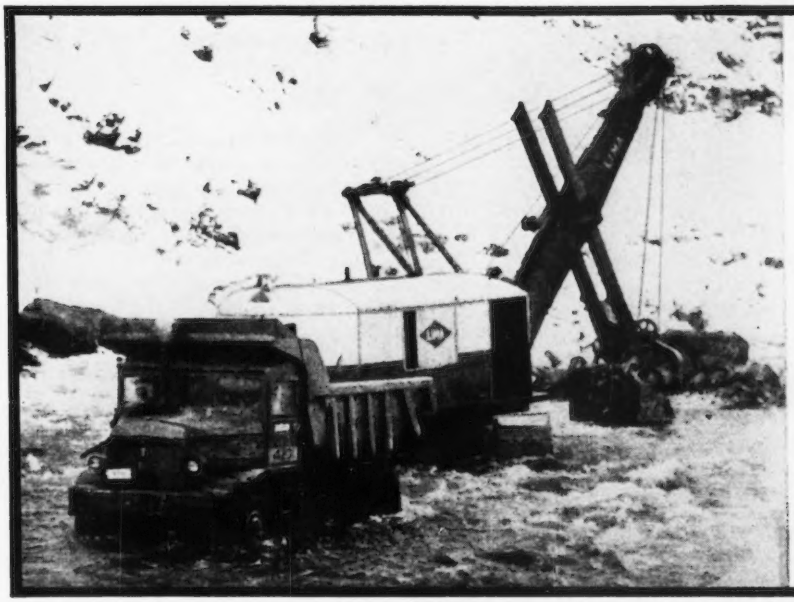
Longyear

In Canada
CANADIAN LONGYEAR LTD.
North Bay, Ontario

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
GEOLOGICAL AND MINING ENGINEERS AND CONSULTANTS
REPRESENTATIVES IN PRINCIPAL MINING CENTERS OF THE WORLD




# LIMA DIRT SEALS CUT DOWN-TIME AND MAINTENANCE COSTS



This LIMA shovel, demonstrates the importance of LIMA'S dirt seals and grease retainers.

In such work, abrasive material which wears out the bushings and shafts of ordinary shovels is excluded. LIMA seals the lubricant in and dirt out, thereby reducing friction and prolonging the life of bushing, roller and shaft.

## COMPARE! No other machine gives you as much as LIMA!

1. Bronze bushings in tread, idler and drive rollers are protected by piston-type dirt seal rings and retainers.
2. All gears, smaller parts and shafts which are subject to extra wear are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation to eliminate excess counterweight.
4. Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.
5. Big capacity drums and sheaves lengthen cable life by reducing the need for double wrapping and sharp bends in cable.
6. Full air controls on travel, hoist, swing and boom hoist, result in smoother, more precise operation, minimum maintenance and less operator fatigue.
7. Torque converter (optional) automatically adjusts speed to load requirements, minimizing shock loading, making performance smoother and faster.
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (¾ yd. to 6 yds.), cranes (to 110 tons) and draglines (variable).

DISTRIBUTORS IN ALL PRINCIPAL CITIES OF THE WORLD

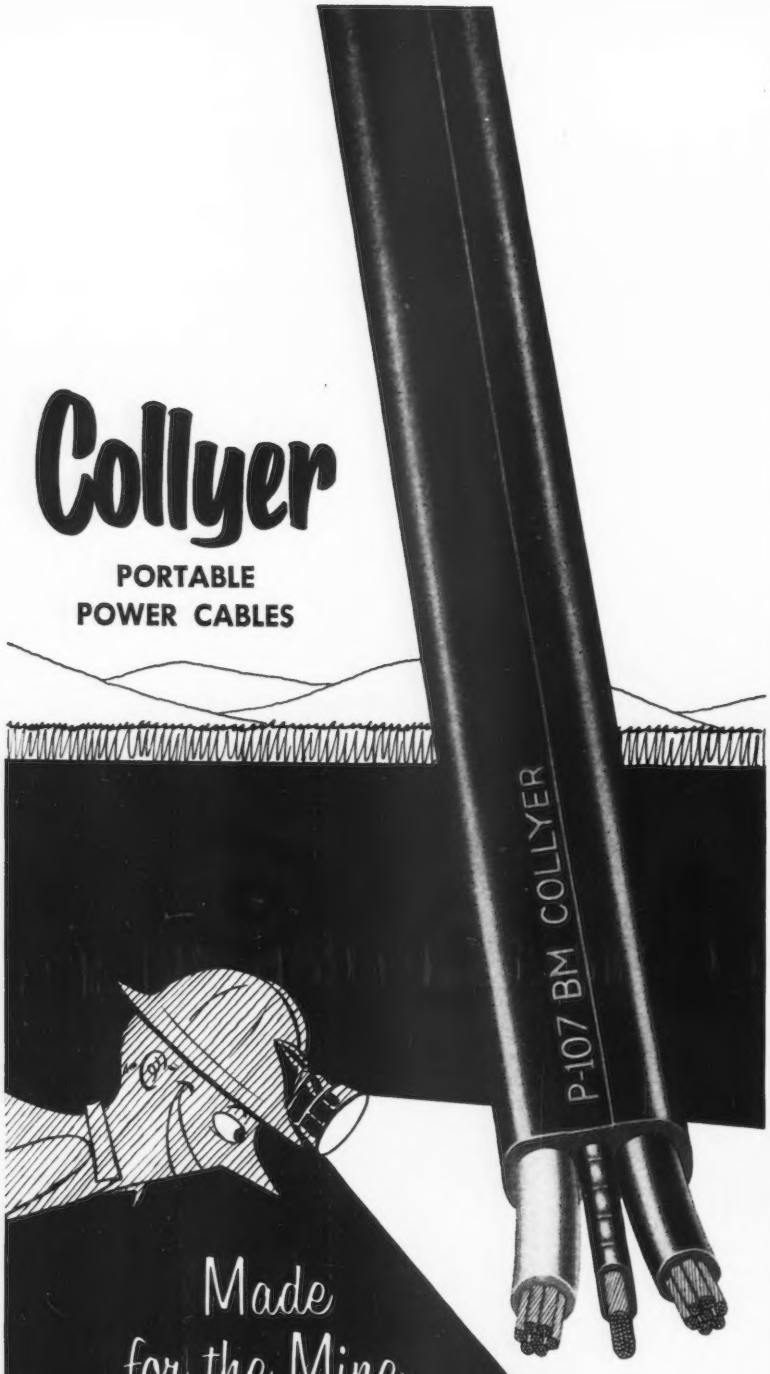
**LIMA**
SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

**BALDWIN-LIMA-HAMILTON CORPORATION**
**Construction Equipment Division**
**LIMA, OHIO, U.S.A.**

# Collyer

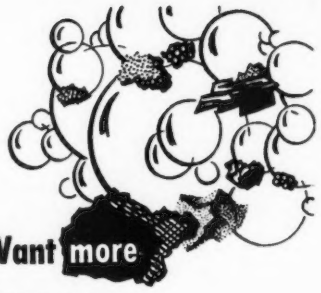
**PORTABLE POWER CABLES**




## Made for the Mine

Collyer welcomes the opportunity of working with you on your mining cable requirements. There's a Collyer cable for every purpose. Write for Bulletin 152 . . . or tell us about your own particular power problems.

Collyer Insulated Wire Co., 245 Roosevelt Avenue, Pawtucket, R. I.



## Want more from your Ore?

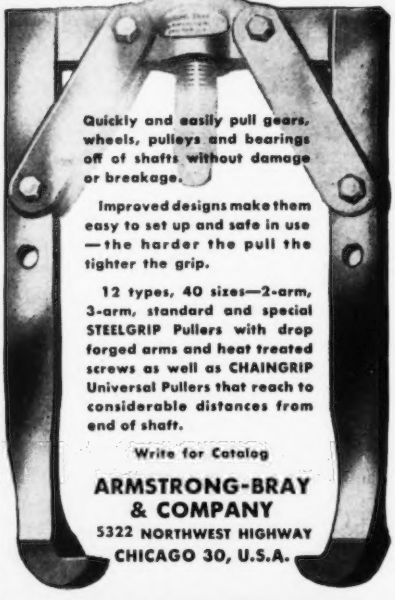
Use N® Silicate of Soda in your flotation process. Recoveries may be improved as much as 10%. N Silicate is an economically priced depressant for the siliceous constituents of the ore.

Make comparative tests to prove its value in the "rougher" and "cleaner" circuits.

**PHILADELPHIA QUARTZ COMPANY**
1135 Public Ledger Bldg.
Philadelphia 6, Pa.

**PQ® Silicates of Soda**
METSO® DETERGENTS

## ARMSTRONG-BRAY
**GEAR and WHEEL PULLERS**



**Quickly and easily pull gears, wheels, pulleys and bearings off of shafts without damage or breakage.**

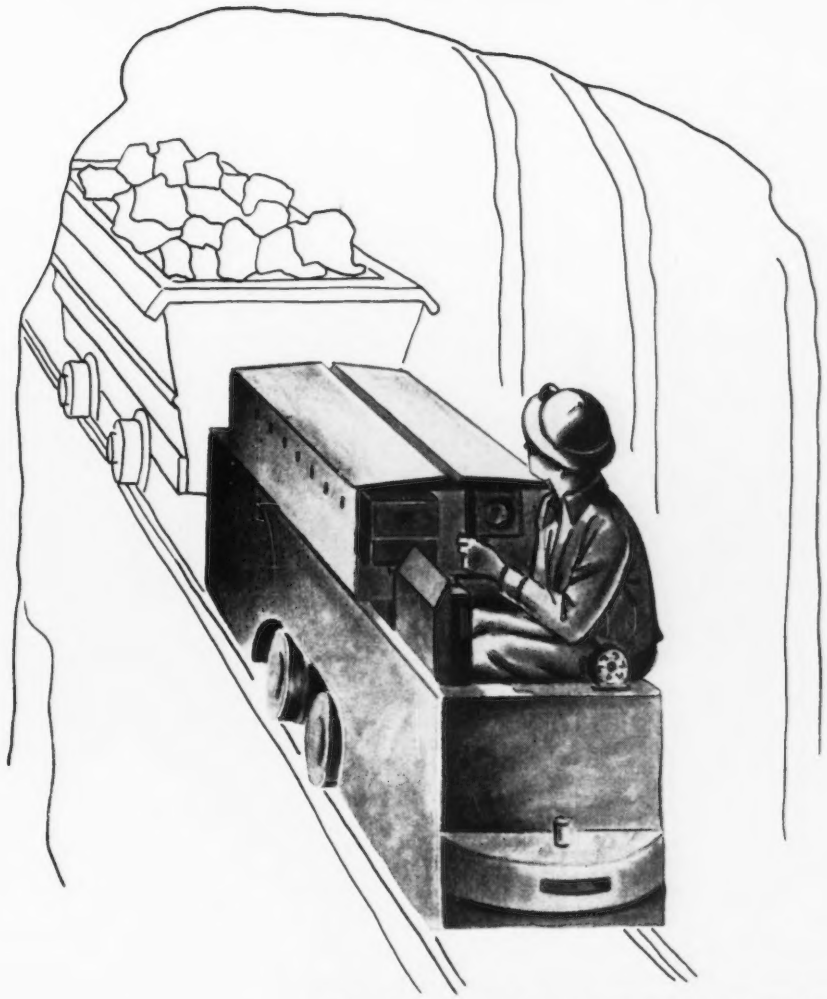
**Improved designs make them easy to set up and safe in use—the harder the pull the tighter the grip.**

**12 types, 40 sizes—2-arm, 3-arm, standard and special STEELGRIP Pullers with drop forged arms and heat treated screws as well as CHAINGRIP Universal Pullers that reach to considerable distances from end of shaft.**

**Write for Catalog**

**ARMSTRONG-BRAY & COMPANY**
**5322 NORTHWEST HIGHWAY**
**CHICAGO 30, U.S.A.**

# Heavy Duty TRAMMING..

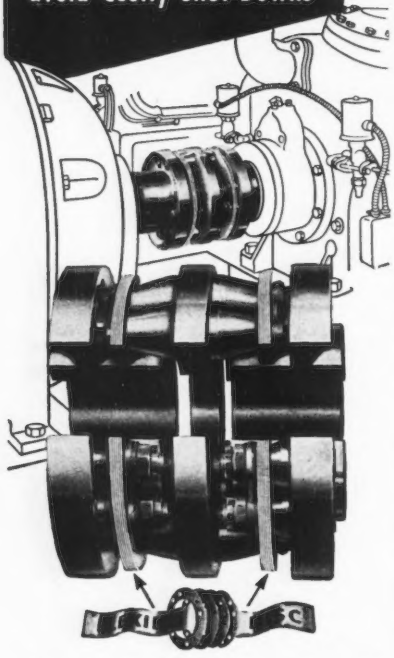


The ATLAS Type K is twice as big as the standard Atlas 1½ ton Type J. It gives you double the power for heavy-duty service. The "K" mounts two standard trammer batteries, interchangeable on the Type J. For specifications, ask for Bulletin 1266.

## THE ATLAS CAR AND MANUFACTURING CO.

**1140 IVANHOE ROAD** **CLEVELAND 10, OHIO, U. S. A.**

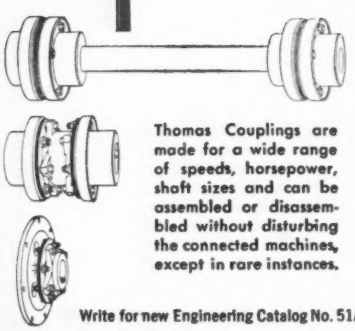
Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

| FACTS | EXPLANATION |
|---|---|
| NO MAINTENANCE | Requires No Attention. Visual Inspection While Operating. |
| NO LUBRICATION | No Wearing Parts. Freedom from Shut-downs. |
| NO BACKLASH | No Loose Parts. All Parts Solidly Bolted. |
| CAN NOT "CREATE" THRUST | Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement. |
| PERMANENT TORSIONAL CHARACTERISTICS | Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained. |



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.


## SPAIN

**Drilling at Astrain near Pamplona reportedly has revealed a potash deposit** extending over 52 sq km. Potential yield was estimated at 80-million tons of pure potassium oxide.

**Fluoruros, S.A., leading fluorspar producer in Spain plans to build a new mill** to be financed in part by a $400,000 Export-Import Bank loan. The company now operates two mines and a mill. Metallurgical fluorspar is the chief product of the company. William Kuster, mining engineer and fluorspar specialist, formerly with Ozark Mahoning Co., has been appointed director of operations for the new mill project.

## GERMANY

**Aluminum production in the Federal Republic of West Germany** will probably attain 130,000 tons this year.

This would make Germany the third biggest producer of aluminum in the world. In 1938, only 31,000 tons more were produced in the old Reich territory than now in West Germany.

# IN AFRICA

**Bethlehem Steel Corp. of the U. S. has announced that it has located two vast deposits of iron ore** amounting to about 225-million tons in the Kaokovelt District of southwest Africa. Discovery was made after 2 yr of surveying and prospecting.

Several tons reportedly already have been shipped to the United States. It was reported that if impurities can be economically removed, Bethlehem will spend nearly $90-million constructing a 100-mi railway, harbor facilities and equipping the mines.

**Sir Ernest Oppenheimer, chairman, Nchanga Consolidated Copper Mines Ltd.,** one of the four leading copper companies of Northern Rhodesia's Copperbelt, reported that Nchanga produced 115,137 long tons of copper during the year ended March 1954. Nchanga's production in 1953 amounted to 93,317 tons; in 1952, 68,816 tons.

Sir Ernest

Sir Ernest said that during the coming year $7-million will be spent developing low-grade orebodies in order to prolong the mine's life. Hitherto, all mining has been done from the "unusually rich and comparatively accessible" Nchanga West orebody. It is now proposed to mine lower-grade Nchanga ores by open pit methods. Pit production will start about 1957.


Kleenslot SCREEN GUARDS

The screen guard is built into the screen and the guard bars permit only the finer particles to pass over the screen. All sizes and most materials furnished.

Cross section at left shows how KLEENSLOT Screens operate on a non-clogging principle.

Wedge Wire KLEENSLOT screen guards can be furnished in special sizes to your requirements in practically any type of long wearing metal. They are made to close tolerances like all Wedge Wire products—the width of each wire is held to plus or minus .002 to insure uniform opening width. All Wedge Wire features are embodied in these screen guards and it is to your advantage to consider them from the standpoint that they are non-clogging, non-blinding, strong, rigid uniform and more economical in the long run.

SEND FOR OUR ILLUSTRATED LITERATURE

Wedge-Wire CORPORATION
GAS ST. AT NICKEL PLATE R.R.
WELLINGTON, OHIO

SCINTILLATION COUNTERS

FIND URANIUM 100 TIMES EASIER

| | |
|---|---|
| MODEL SC-8 (pictured above) | $495.00 |
| MODEL 111 | $495.00 |
| FAMOUS HALROSS SCINTILLOMETER, MODEL 939 | $975.00 |
| AIRBORNE OPTIMUM MODEL SAB-7 | $2810.00 |

• • •

ALL TYPES GEIGER COUNTERS
ULTRA VIOLET LIGHTS
SPECIAL
LONG PROBE SCINTILLATION AND GEIGER COUNTERS FOR DRILL HOLES

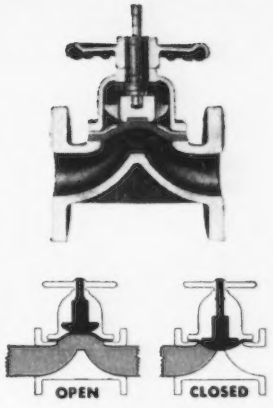
• • •

Engineers Syndicate, Ltd.
The oldest and most experienced supplier of Scintillation Counters in the United States.
5011 Hollywood Boulevard
Hollywood 27, California

# GRINNELL-SAUNDERS DIAPHRAGM VALVES

In hundreds of installations, the maintenance-saving design of Grinnell-Saunders Diaphragm Valves has accounted for important economies of labor and money. The only part that will in time need replacement is the diaphragm, and depending on the type of service, it may last for years. To replace it takes only a few minutes. You merely remove the four bolts holding the bonnet, leaving the body in the pipe line . . remove the worn diaphragm, insert the new diaphragm . . replace the bonnet and bolt it down. No refacing or reseating required . . no packing glands to demand attention.

Originally perfected for air and water service, Grinnell-Saunders Diaphragm Valves are now widely specified for many other applications. They greatly reduce replacement and maintenance expenses, especially in lines where corrosion, abrasion, contamination, clogging and leakage can be costly factors. Write today for the Grinnell-Saunders Diaphragm Valve Catalog . . and assign your next valve problem to Grinnell.




**Other Important Features:**

Diaphragm absolutely isolates working parts from the fluid stream

Diaphragm lifts high for full, streamline flow in either direction

Diaphragm presses tight for positive closure

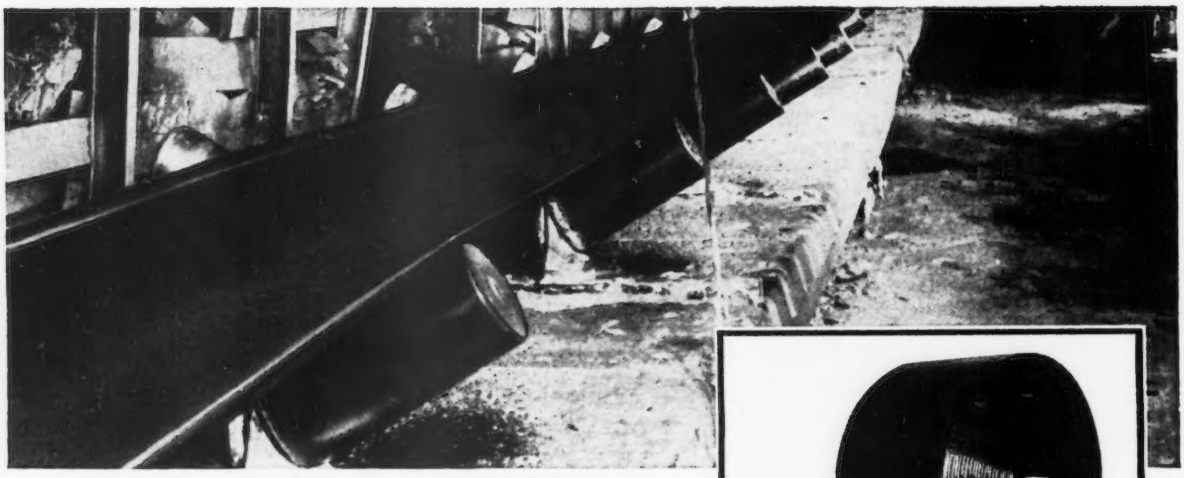
Body, lining and diaphragm materials to suit service

# GRINNELL

**WHENEVER PIPING IS INVOLVED**

**Grinnell Company, Inc., Providence, Rhode Island** — **Coast-to-Coast Network of Branch Warehouses and Distributors**

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems



*Top photo shows Face Conveyor in British coal mine. Inset shows roll of SCANDURA.

# NEW SCANDURA

## the original P.V.C. coated CONVEYOR BELTING

## eliminates big FIRE HAZARD in mining operations

One of the great hazards of mining—fire caused by a belt stalled over a still-rotating driving drum—is eliminated by new SCANDURA BELTING .... the original P.V.C. Coated Conveyor belt which was developed in the United Kingdom and now manufactured by us in our Charlotte, N. C. plant.

### LET'S LOOK AT THE RECORD!

**About 12% of coal mining fires in the past several years have been attributed to conveyor-belt friction.**

**At the 1953 annual meeting of the Illinois Mining Institute, data was presented to show that the majority of belt fires result from stalled belts while the driving pulley continues pulling.**

**In the tragic Evanston, Ky. fire in which 4 men lost their lives, fire was reported to have had its origin in the friction caused when a fall stopped the belt, while the drive motor continued to operate.**

**This record clearly points to the great need for SCANDURA BELTING!**

**Other unique SCANDURA features:**

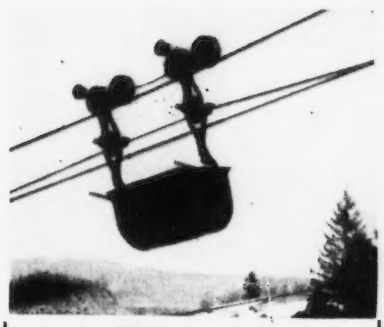
- *Withstands abrasions that would ruin other belts.*
- *Exceptionally tenacious in holding fasteners.*
- *Solid woven base with covers that will not strip, gouge or "dog ear".*
- *Not affected by water, dilute acids, alkalis, salt solutions, etc.*
- *Non-inflammable, mildew and rot-proof.*
- *Works in temperatures ranging from 22° below to 212° above.*
- *Can be made in widths from 1" to 42" and thicknesses from ⅛" to ⅜".*

SCANDURA has been tested and used with gratifying results in Britain since 1946. For safety and economy, it's in a class by itself. Write, wire or telephone for complete data.

**SCANDINAVIA BELTING COMPANY**

250 CENTRAL AVENUE, NEWARK 1, N. J.

BOSTON • **PLANT: CHARLOTTE 1, N. C.** • CLEVELAND



**RIBLET**
**AERIAL TRAMWAYS**

*DOWNHILL UPHILL*
*ON THE LEVEL*

Most satisfactory means of moving your product in any situation. Low total cost, simple operation, versatility of design, make a Riblet Aerial Tramway the best solution for any-distance transport. Types and capacities for hauling ores, concentrates, mine or mill wastes, mining supplies, or whatever you may suggest.

Consult experienced, versatile, exclusive designers of Aerial Tramways.

**RIBLET TRAMWAY CO.**
Box 7, Sta. A Spokane, Wash., U.S.A.

**WEIGH** WITHOUT STOPPING
WHILE YOU **CONVEY**

*Yes, weigh and record with the* —MERRICK

**WEIGHTOMETER**

The Merrick Weightometer provides a continuous, automatic, accurate weight record at any designated point in the mill, while material is in motion on conveyor. It weighs without interrupting conveyor service. Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

**MERRICK** SCALE MFG. CO. PASSAIC N. J.

## Africa *(Continued)*

**Another Copperbelt leader, Mufulira Copper Mines Ltd., enjoyed a record output** of 90,300 long tons during the year ended June 30. Best previous output was 86,681 long tons in 1950-1951.

**Nickel Corporation of Africa Ltd. announced that it has acquired option and prospecting contracts** in the Klerksdorp/Venterspost District. Government geological survey maps indicate outcroppings of the Dominion Reefs series. Drilling contracts have been let. Operations were to start shortly.

**Transvaal and Free State Chamber of Mines statistics show that the total output of gold** for the first seven months of this year from mines under its aegis was 7,437,868 oz. This was an increase of 559,473 oz compared with the corresponding period last year.

Uranium profits for the first six months of this year, after providing for interest and loan repayments, amounted to about $93-million, it was added.

**Royalty payment on all chome output in Rhodesia** has been remitted from May to December of this year. Minister of Mines made this decision because the chrome decision has been deteriorating steadily. Both demand and price have decreased.

**In its first month of operations, the President Brand Mines** in the Free State produced 12,292 oz of gold from 30,000 tons milled. Another Free State mine, the President Steyn, also figured prominently in August returns. Steyn upped its milling rate by 3000 tons to 50,500 and also increased the amount of gold won by 2539 oz to 15,623 oz.

**Harmony gold mine at Harmony, 80 mi northeast of Bloemfontein in the Orange Free State was opened officially** by W. H. A. Lawrence, chairman of the Central Mining & Investment Corp.

This mine is the eighth on the goldfields to reach production. The Harmony Gold Mining Co. was founded in 1950. In reaching production after only 4 yr of existence, the Harmony set an OFS record. Usually 5-6 yr are required for a newly-formed installation to begin producing.

At present, the Harmony reduction plant has a capacity of 45,000 tons a month; a second unit which would approximately double capacity is under construction.

The mine is to be a uranium producer also. Its uranium plant is slated to enter production soon.

**A new type of riffle concentrator belt adapting the established method** of recovering free gold from pulp ore by passing the pulp stream over corduroy tables has been introduced in South Africa.

The new concentrator, which combines the advantages of labor-saving, low running costs and security against gold thefts is being extended.

Briefly, the concentrator consists of the continuous rubber belt with a surface similar to that of corduroy 5 ft wide and 9 ft long, passing around two rollers inclined horizontally.

**MINING OPERATORS USE McCarthy Drills**

*Heavy-Rugged Powerful*

AT Bessemer Limestone & Cement Co., Bessemer, Pa., one McCarthy unit (above) averages 90 ft. per hour, drilling through hard blue shale and sand rock 34 ft. deep. Blast holes are drilled on 18-ft. centers. Two men handle the whole job, including setup and moving. McCarthy drills operate with gasoline, diesel or electric power units . . . on all types of mounts. McCarthy "money-savers" can work for you. See your nearby distributor or write Salem Tool direct for further information.

SALEM **THE SALEM TOOL CO.**
803 S. ELLSWORTH AVE.
SALEM, OHIO · U. S. A.

**BEE-ZEE SCREENS...**
**proved and improved!**

More accurate sizing, sharper separation and more complete deliquefying made Bee-Zee Screens famous. Over the years, praises and re-orders poured into Galesburg. Bee-Zee quality was proved again and again... but not to Bee-Zee engineers!

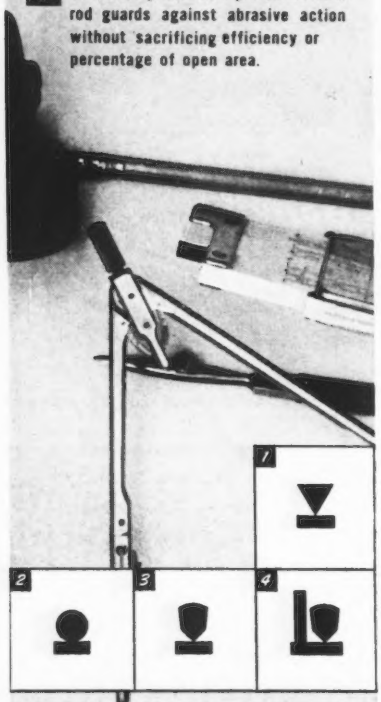
Bee-Zee engineers know that your customers can well afford to be hair-splittingly choosey... that your product faces stiff competition every day... that you *must* produce quality and still greater quality to make sales. So new specialized shapes were created. (See them below.) They *make you money* like never before!

1 Tri-Rod for knife-like separation.

2 Round Rod for long-lived accuracy.

3 New Grizzly Rod combines the best features of round and tri-rod.

4 New Grizzly Rod with protective skid rod guards against abrasive action without sacrificing efficiency or percentage of open area.




**CALL US COLLECT Galesburg, Illinois, 4397**
Give us your screening requirements by phone, wire or letter. We'll give you eye-opening facts about Bee-Zee Screens.

Bee-Zee Screens are precision spot-welded of stainless steel... can be fitted to any screening equipment ... with supporting rods spaced for best performance.

**BIXBY-ZIMMER**
*Engineering Co.*
5114 Abingdon Street, Galesburg, Illinois

## Africa *(Continued)*

The pulp stream is directed laterally onto the raised end of the belt which moves continuously against the stream. A jet of water directed towards the underside of the belt washes off the gold collected in the riffles.

Overflow goes back into the milling circuit and the concentrate to the amalgamation plant. Each unit is totally enclosed and the concentrate is not touched by hand.

The Anglo American Corp., which developed the concentrator, finds that each unit can handle pulp containing 200 tons of solids in 24 hr.

A further advantage of the concentrator is that it recovers osmiridium currently. Formerly, a certain amount of this was recovered during relining of tube and ball mills, but this represented only a small proportion of the amount present in the ore treated.

**Messina (Tvl.) Development Co., which operates the Messina copper mine** in the Northern Transvaal, has celebrated its 50th anniversary. The mine is the only fire-refined copper producer in South Africa.

**Production of lithium ores is growing in Southern Rhodesia.** Latest monthly figures reflect 4585 tons valued at nearly $65,000. Lithium ores were first mined in 1950.

**Mufulira Copper Mines in Northern Rhodesia produced 87,972 long tons of copper** for the year ended June 30, which compares with 76,089 long tons for the previous 12 months.

**Freddies Consolidated Mines—one of the major Free State gold mines**—is to produce uranium by the end of this year. Slimes are to be pumped from Freddies to the Welkom G.M. uranium plant for treatment.

**Estimated profit from uranium, subject to adjustment,** for the first half of this year from the mines at present recovering uranium from gold residues was approximately $9.5-million.

Top profit was earned by West Rand Consolidated—the first mine to undertake this work—with more than $2.8-million. Daggafontein and Western Reefs were second with $1.75-million each.

**Because the Rhodesian Railways cannot carry all coal needed from the Wankie Colliery in Southern Rhodesia** and because the South African Railways cannot take Union coal to the coast for export to Northern Rhodesia through Lobito Bay, the Northern Rhodesia copper mines are importing coal from the U.S.A. through Lobito Bay and the Benguela Railway.

Cost of this coal will be about $31 a ton against $2.40 for Wankie coal.

The copper mines stated that they were willing to buy coal from any source at a reasonable price to stay in production. Current needs are about 90,000 tons a month; half of this can be met by burning wood.

**The Whole Story is Here for You!**

*20 Pages of*
**FACTS · FIGURES · PICTURES**

***MineVent Flexible Ventilation Tubing***

How it is made and used, why it is better, sizes, friction loss charts.

***ABC Powder Bags***

How they are made, capacities, etc.

***ABC Brattice Cloth***

7 types described. How it is produced, sizes, etc.

***ABC Inflatable Brattice***

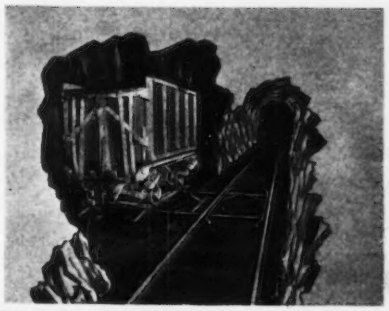
For fast stoppings in metal or coal mines. How to use them, sizes, etc.

**SEND FOR *YOUR* COPY TODAY!**

**AMERICAN BRATTICE CLOTH CORP.**
*WARSAW, INDIANA*

**Main Office: 220 Buffalo St.**

# wise old owl says..



## The American Mine Door Company

**2039 Dueber Ave., Canton 6, Ohio**

***Also manufacturers of self-liquidating Track Cleaners, Rock Dusters, Electric Switch Throws, Automatic Mine Doors.***

CANTON QUICK-ON CABLE SPLICER

Make an on-the-job cable splice. Practically no down time. No special tools required. Just pound around meshed cable ends. Stronger than the cable. Write for sample, using street and zone numbers.

# STRAUB

## *HAS RIB-CONE MILLS FOR ALL GRINDING OPERATIONS*

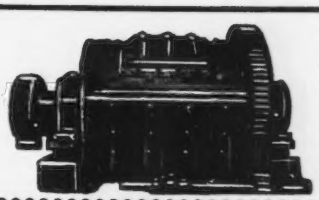
**More than 100 sizes and types of ball mills. 40 years of experience in supplying every conceivable grinding requirement is at your disposal in the form of engineering counsel. *An inquiry to our engineering department will bring a prompt reply.***

**STRAUB MFG. CO.**

**8383 BALDWIN STREET • OAKLAND 21, CALIF.**

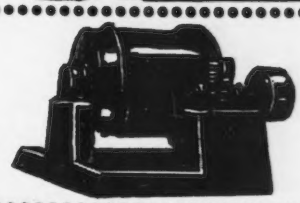
**SECTIONALIZED MILL**

Completely assembled in our shop, then marked and knocked down for shipping "Anywhere a Mule Can Go."



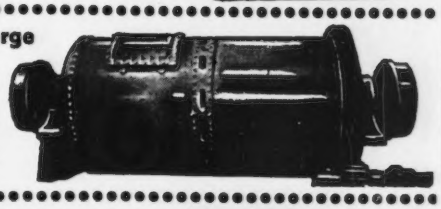
**SCREENING MILL**

Most economical type. Particularly suited to amalgamating and concentrating classes of ores. Capacity from 2 to 95 tons per 24 hours.



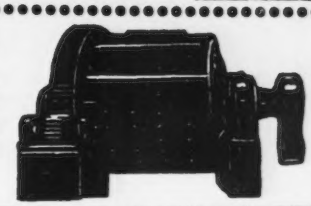
**Peripheral Discharge MILL**

Particularly suitable for producing a granular product. Designed for controlled grinding of tungsten and similar ores where sliming must be eliminated.



**LOW PULP LINE MILL**

One of the new Champion Series. Available in low pulp line, plain overflow, screening and convertible types with capacities ranging from 25 to 250 tons per 24 hours.



★ More than 100 Sizes and Types of RIB-CONE Ball Mills

SINCE 1856
HUMBOLDT
Mines Equipment, Mineral Dressing Plants, Crushing and Grinding Machinery, Cement Factories, Metallurgical Works, Coal Preparation Plants, Steel Constructions for Buildings and Bridges.
SINCE 1864
DEUTZ
Otto-, Gas-, Diesel-Engines for Every Purpose of Two- and Four-Stroke design, Output range 3-1650 H.P. Cooled by water or air, Diesel-powered tractors, Diesel locomotives, Gas producer plants.
SINCE 1864
MAGIRUS
Trucks and busses driven by air cooled DEUTZ Diesel engines, Vehicles for municipal services, Fire ladders, fire engines, Fire fighting water trucks, Two-wheeled ladders, Fire fighting equipment.
KLÖCKNER-HUMBOLDT-DEUTZ AG·KÖLN

*Address inquiries from U.S.A., Alaska, Hawaii and Puerto Rico to:*
*DIESEL ENERGY CORPORATION, 143 Liberty Street, New York 6, N. Y.*
*Certain territories open for distributors*

# OLIVER FILTER

**The Far-Flung Choice for Handling URANIUM ORES**

Belgian Congo, South Africa, Australia, Canada, United States . . . in these important uranium producing areas, the Oliver Filter has been the choice of those in charge of milling the uranium ores. Close to 300 units are already installed or on order.

In a real sense, this is another FIRST for Oliver United for these filters pioneered the filtration phase of the intensive drive for uranium all over the world. Two factors were largely responsible for this clear-cut preference of Oliver Filters:

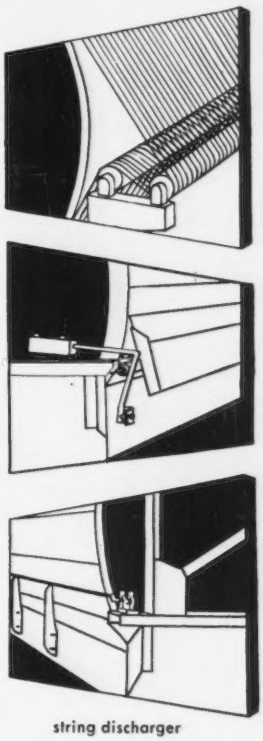
**a** . . . Oliver United, as a filtration engineering firm in business since 1907, showed by far the broadest knowledge of and experience with the filtration of ores.

**b** . . . Oliver United, as a manufacturing firm, showed by far the widest selectivity in filter types, thus assuring operators they would get filters that would do the best work.

Perhaps this strong preference for Oliver United equipment and services on the part of those milling uranium ores will suggest where you can get the best in filters, regardless of kind of ore or tonnage to be handled.

• • •

While both wire wound and panel type Oliver Filters are being used today, the trend in filter selection is now strongly toward the Oliver Panel Filter (shown above) not only because of the ease with which cloths can be changed but even more important because it can readily handle thick or thin cakes. The Panel Filter lends itself to several different types of cake dischargers: taut suspension wire, string, and counter-balanced, swinging scraper.



string discharger

counter-balanced, swinging scraper

taut suspension wire discharger

**WORLD WIDE SALES, SERVICE AND MANUFACTURING FACILITIES**

**OLIVER UNITED FILTERS** OUF INC. INC.

NEW YORK 36 — 33 West 42nd Street • CHICAGO 1 — 221 North LaSalle Street
OAKLAND 1 — 2900 Glascock Street • SAN FRANCISCO 11 — 260 California Street
International Sales Office — New York • Cable — OLIUNIFILT

FACTORIES:
Hazleton, Pa.
Oakland, Calif.

# WEST END 58% SODA ASH is FREE-FLOWING

Air-separation gives West End ash exceptional uniformity of particle size and density resulting in outstanding free-flowing characteristics. This uniformity tends to prevent classification and caking under normal handling and storage conditions. When put into process, West End ash is free-flowing and non-dusting.

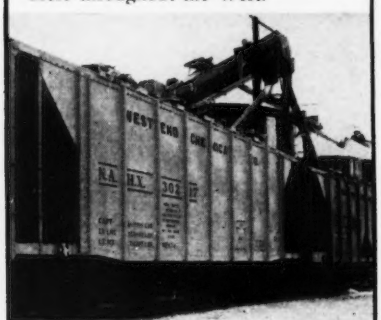
## NON-DUSTING WHEN WE SHIP IT — NON-DUSTING WHEN YOU USE IT!

West End's unique classifying system . . . a combination of air-separation and screening . . . insures complete control of dustiness in the product. Excessively coarse particles are removed. By cutting dust loss to a minimum, West End gives added economy to every industrial process.

In laboratory test, wheat grains freely flow through a ½" funnel at 166 cubic inches per minute. West End 58% Soda Ash in the same test flows at 183 cubic inches per minute.

### Orders Filled Immediately

Large stocks of soda ash are kept constantly in storage to fill all requirements promptly. West End's location provides the most rapid and economical shipment of soda ash available to users throughout the West.



West End's fleet of leased hopper cars is always ready to serve.

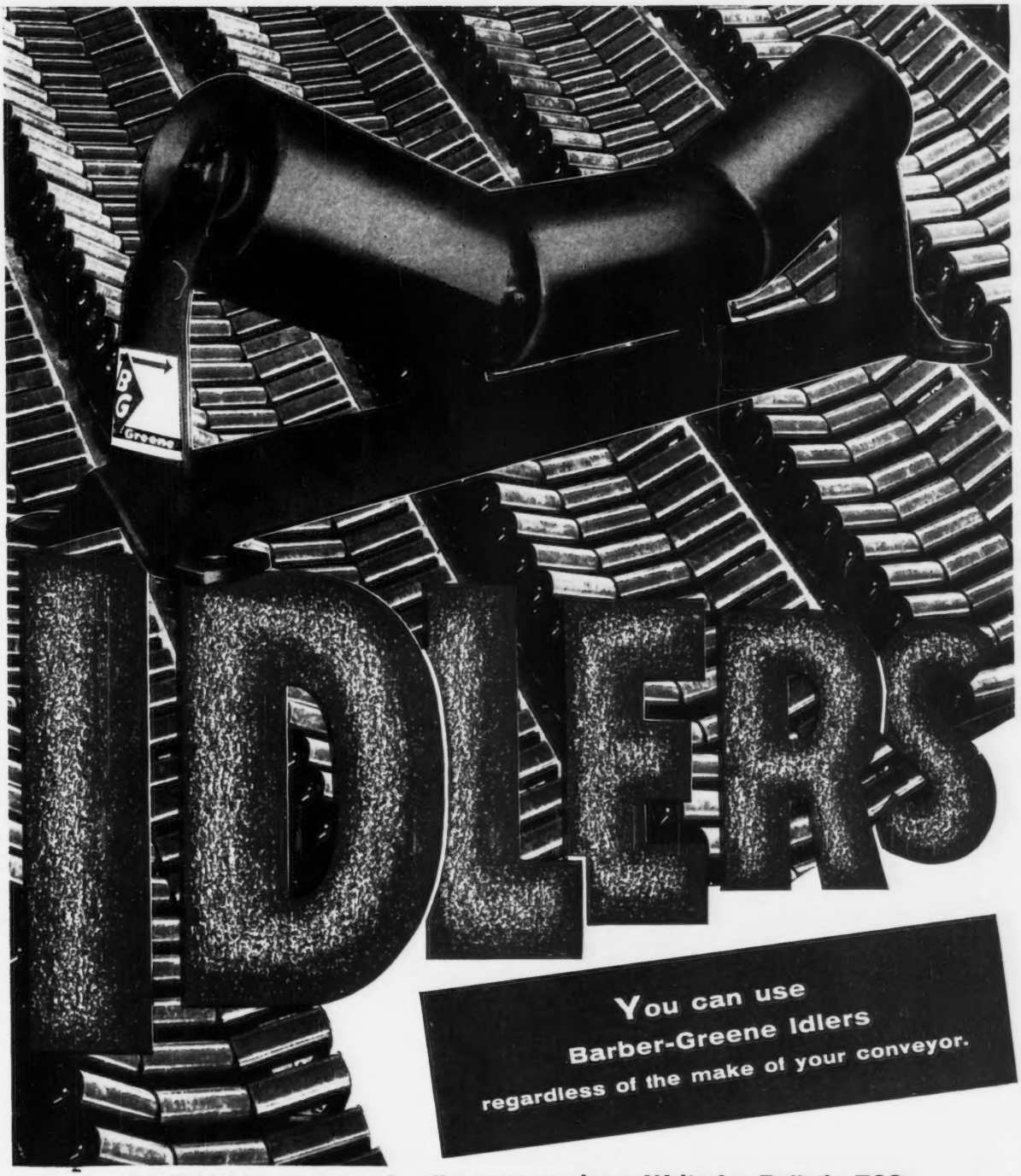
30 minute in-and-out loading for bulk trucks at any hour of day or night through "serve yourself" delivery.

*Write for samples, prices and technical data.*

**WEST END CHEMICAL COMPANY**

SODA ASH · F. M. SMITH BRAND BORAX · HYDRATED LIME

Executive offices: 608 Latham Square Building, Oakland 12, California · Plant: Westend, California




**Available in all types, in all common sizes. Write for Bulletin 76C.** 54-42-PE

# Barber-Greene

AURORA, ILLINOIS, U.S.A.

WRITE for INFORMATION

descriptive literature . . . sound movies

cost studies . . . nearby job inspection . . . plant layouts

# All business is specialized

*. . . and nothing specializes on your business like your business paper*

You can sell suntan lotion on Broadway or Beacon Street, but this seagoing salesman can sell a whale of a lot more . . . because he *specializes.*

Your business is specialized, too. That's why it pays to keep up with your business paper. It specializes on business problems you meet every day. It helps you do a whale of a lot better job by keeping you posted on your whole field. You can *move ahead* when you know what's ahead; you can make quicker, surer decisions when you have a clear perspective on what's happening; and you get all this from your business paper.

Every page counts. The editors gather facts, weigh and interpret them. The advertisers line up new products, materials and equipment . . . tell you what they do and where to buy them. To know what's new that's important to you, read *every* issue—thoroughly! It will keep you one of the best informed people in your field.

---

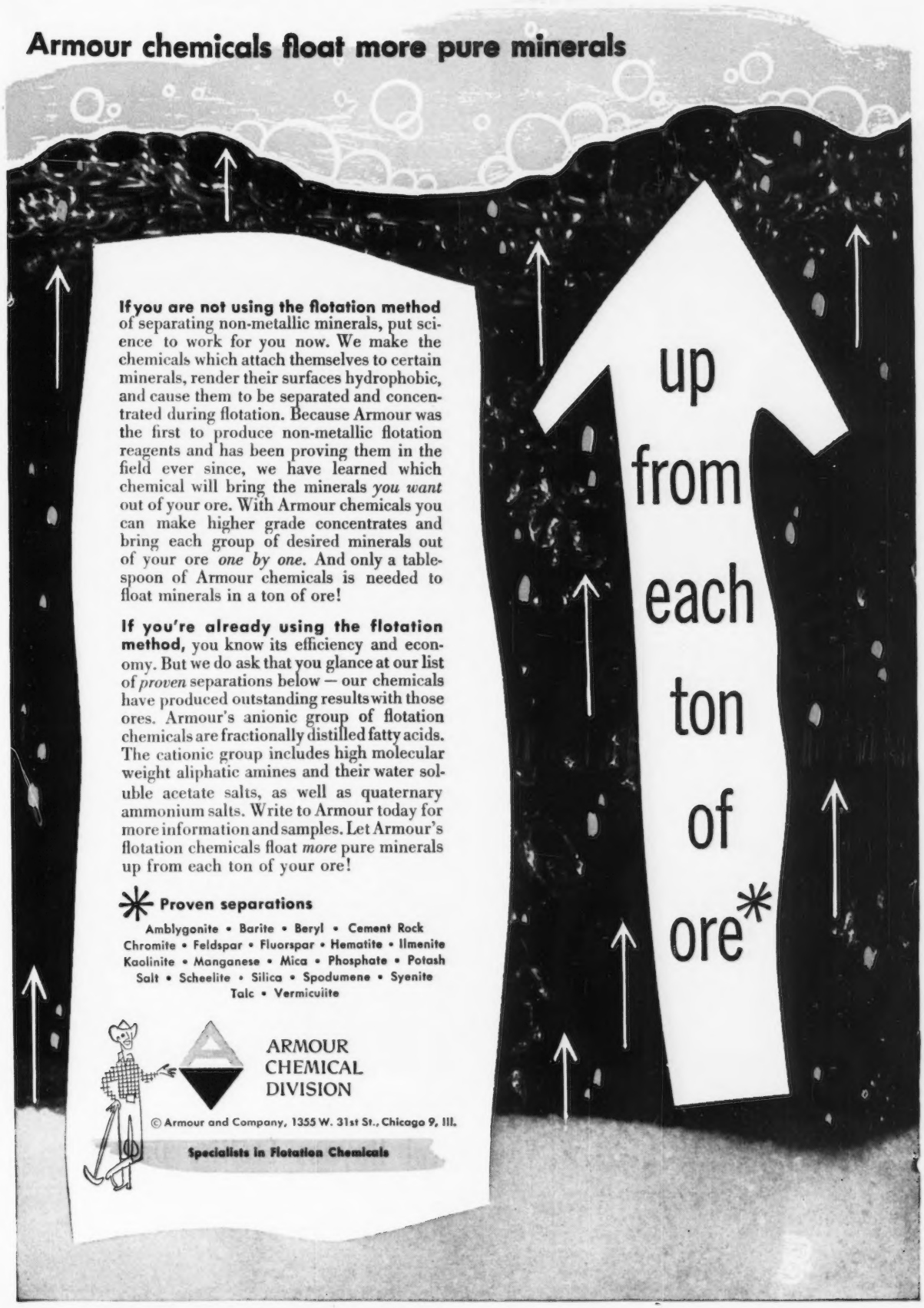
This business paper in your hand has a plus for you, because it's a member of the Associated Business Publications. It's a paid circulation paper that must earn its readership by its quality . . . And it's one of a leadership group of business papers that work together to add new values, new usefulness, new ways to make the time you give to your business paper still more profitable time.

**A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet." Room 2710.**

**McGRAW-HILL PUBLISHING COMPANY**
**330 West 42nd St., New York 36, N. Y.**

One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

# Armour chemicals float more pure minerals




**If you are not using the flotation method** of separating non-metallic minerals, put science to work for you now. We make the chemicals which attach themselves to certain minerals, render their surfaces hydrophobic, and cause them to be separated and concentrated during flotation. Because Armour was the first to produce non-metallic flotation reagents and has been proving them in the field ever since, we have learned which chemical will bring the minerals *you want* out of your ore. With Armour chemicals you can make higher grade concentrates and bring each group of desired minerals out of your ore *one by one.* And only a tablespoon of Armour chemicals is needed to float minerals in a ton of ore!

**If you're already using the flotation method,** you know its efficiency and economy. But we do ask that you glance at our list of *proven* separations below — our chemicals have produced outstanding results with those ores. Armour's anionic group of flotation chemicals are fractionally distilled fatty acids. The cationic group includes high molecular weight aliphatic amines and their water soluble acetate salts, as well as quaternary ammonium salts. Write to Armour today for more information and samples. Let Armour's flotation chemicals float *more* pure minerals up from each ton of your ore!

* **Proven separations**

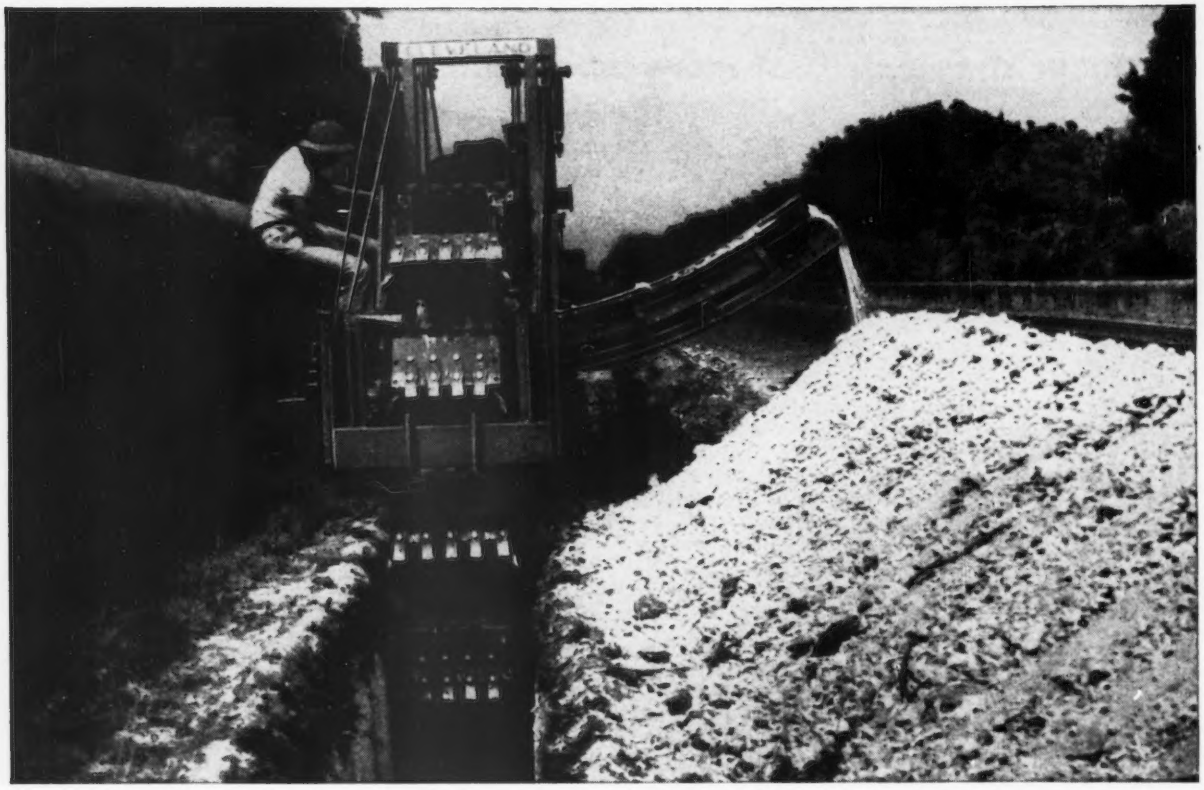
Amblygonite • Barite • Beryl • Cement Rock
Chromite • Feldspar • Fluorspar • Hematite • Ilmenite
Kaolinite • Manganese • Mica • Phosphate • Potash
Salt • Scheelite • Silica • Spodumene • Syenite
Talc • Vermiculite



ARMOUR
CHEMICAL
DIVISION

© Armour and Company, 1355 W. 31st St., Chicago 9, Ill.

**Specialists in Flotation Chemicals**



# Double the Life of Earth-Moving Equipment *by* **Hard-Facing**

Trencher teeth stay sharper 2 to 3 times longer when hard-faced with HAYSTELLITE tungsten carbide rod. The hard-facing material protects the teeth from severe abrasion as they tear through rock, sand, shale, and clay at high speeds. HAYSTELLITE tungsten carbide has good shock resistance, too, and won't chip off under sudden impact.

On this job, the teeth were made of a tough vanadium steel and faced with a thin layer of HAYSTELLITE tube rod. The combination of a tough base metal and an extremely hard, wear-resistant surface helped to double the continuous service life of the trencher. Other earth-moving equipment subjected to abrasion and impact can be protected in the same way. Bull-dozer blades, dipper teeth, post-hole diggers, road disks and plows, will all operate for long periods of time, at low maintenance cost, when hard-faced with HAYSTELLITE tube rod.

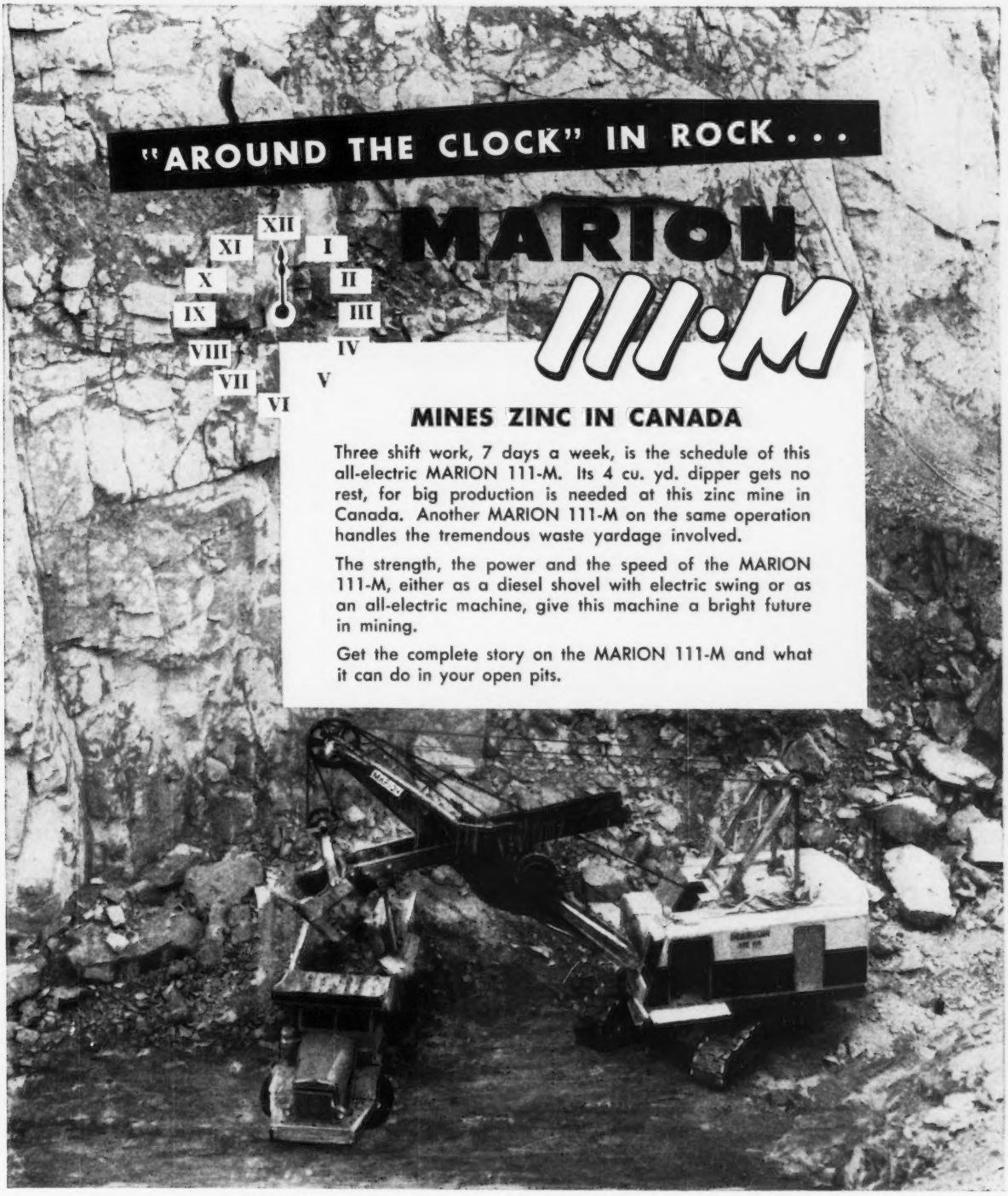
Your local dealer carries a complete line of HAYNES hard-facing alloys. He will be glad to recommend a HAYNES rod especially designed to resist abrasion, corrosion, impact, erosion or heat. Ask him for descriptive literature. If you don't know the location of your local dealer, write to Haynes Stellite Company, a Division of Union Carbide and Carbon Corporation, Kokomo, Indiana, for full details.

*See...* Your local Haynes Stellite Dealer

— or —

*Write...* to Haynes Stellite Company

"Haynes" and "Haystellite" are registered trade-marks of Union Carbide and Carbon Corporation.




## MINES ZINC IN CANADA

Three shift work, 7 days a week, is the schedule of this all-electric MARION 111-M. Its 4 cu. yd. dipper gets no rest, for big production is needed at this zinc mine in Canada. Another MARION 111-M on the same operation handles the tremendous waste yardage involved.

The strength, the power and the speed of the MARION 111-M, either as a diesel shovel with electric swing or as an all-electric machine, give this machine a bright future in mining.

Get the complete story on the MARION 111-M and what it can do in your open pits.

# MARION POWER SHOVEL CO.

MARION, OHIO, U. S. A.

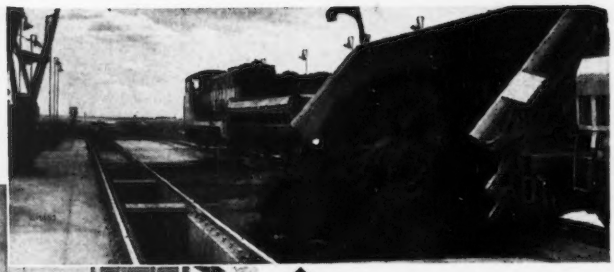
OFFICES AND WAREHOUSES

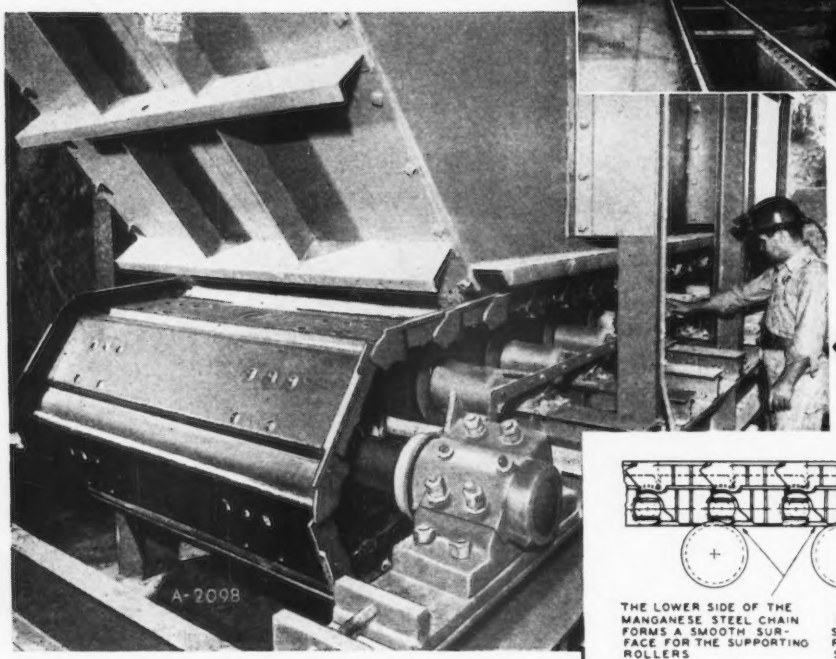
from 1 to 60 cu. yds.

IN ALL PRINCIPAL CITIES

**OSGOOD • GENERAL,** a subsidiary, manufactures excavating machines from ½ to 2½ cu. yds., truck cranes from 15 to 25 tons, Mobilcranes from 25 to 45 tons, and log loaders.

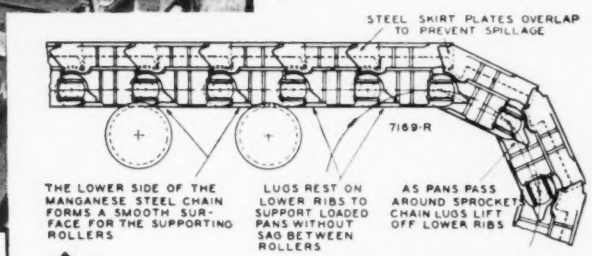
# S-A "AMSCO" MANGANESE FEEDERS






"AMSCO" Feeders withstand the punishing impact and abrasion of ore loads—often falling many feet—through multi-million ton service. One unit logged over 26-million tons in a seven year period, another has handled 65-million tons in 23 years . . . typical examples of outstanding service in both long life and tonnage.

This "AMSCO" secondary feeder discharges to belt conveyor. An S-A Tel-level control automatically stops the feeder if there is a choke-up.


STEEL SKIRT PLATES OVERLAP TO PREVENT SPILLAGE
7169-R
THE LOWER SIDE OF THE MANGANESE STEEL CHAIN FORMS A SMOOTH SURFACE FOR THE SUPPORTING ROLLERS
LUGS REST ON LOWER RIBS TO SUPPORT LOADED PANS WITHOUT SAG BETWEEN ROLLERS
AS PANS PASS AROUND SPROCKETS CHAIN LUGS LIFT OFF LOWER RIBS

Elevation of S-A "AMSCO" pans and chain showing knee-action lugs at joints. Lugs permit chain to bend freely around sprockets but prevent sagging between track-rollers, even under load. Bottom of chain forms a smooth surface for the track-rollers.

## No Matter How Brutal the Beating, They Come Back for More...MUCH LONGER

## Because all wearing parts are made of MANGANESE, the toughest steel known to man

Thousands of tons of ore and rock crash down every day . . . and these smashing, loading impacts continue year after year . . . yet S-A "AMSCO" Feeders unfailingly handle high tonnages from car dumps, primary crushers and loading pockets—feeding to or from scalping screens — meeting every application where feeders must absorb heaviest abrasive punishment . . . with practically no maintenance.

Nothing but Manganese steel will withstand these repeated, punishing impacts, this constant abrasive action . . . that's why in S-A "AMSCO" Feeders, pans, chains, pins, bushings, track roller, sprocket — in fact *all components subject to wear* — are made of manganese steel . . . and actually become tougher and more abrasion-resistant with repeated shocks.

S-A "AMSCO" Feeders are individually engineered to provide lowest cost-per-ton handling for heaviest-duty applications. Tremendous in size and capacity, they have a life expectancy rated in millions of tons — as proved by their record in mines since 1908.

An S-A engineer will give you complete information — or wire for our Bulletin No. 54.

SINCE 1901 S-A STEPHENS-ADAMSON MFG. CO.

**STEPHENS-ADAMSON MFG. CO.**

4 Ridgeway Avenue, Aurora, Ill. • Los Angeles, Calif. • Belleville, Ont.

**Engineering Division**
Specialists in the design and manufacture of all types of bulk materials conveying systems.

**Standard Products Division**
A complete line of conveyor accessories including centrifugal loaders—car pullers—bin level controls—etc.

**Sealmaster Division**
A complete line of industrial ball bearing units available in both standard and special housings.

## ACME STOPER

# JUMBOLTER

**installs roof bolts three times faster**

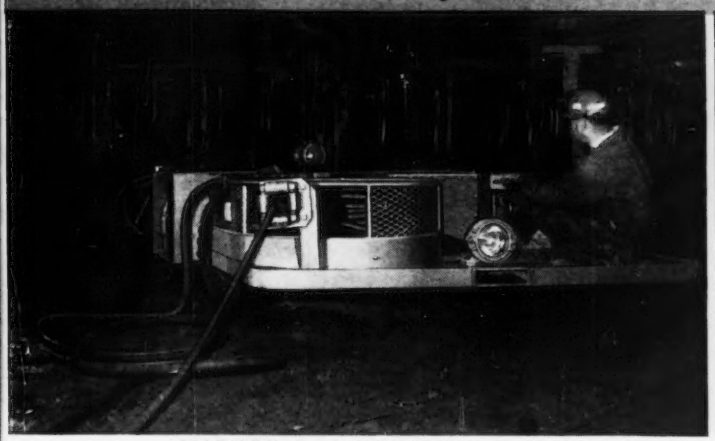
Acme's Stoper Jumbolter is the mine operator's biggest time and money saver since the first stoper. Typical performance: With Jumbolter, two men can complete in 15 minutes a job that used to take three men with hand stopers 45 minutes. Another mine operator reports 210 42" roof bolts installed in one 6½ hour shift with Jumbolter!

With the stretch of an octopus, Jumbolter's air-articulated arms reach out 9 feet, swing in 270° arc . . . bolt an area 23' 10" wide without moving machine.

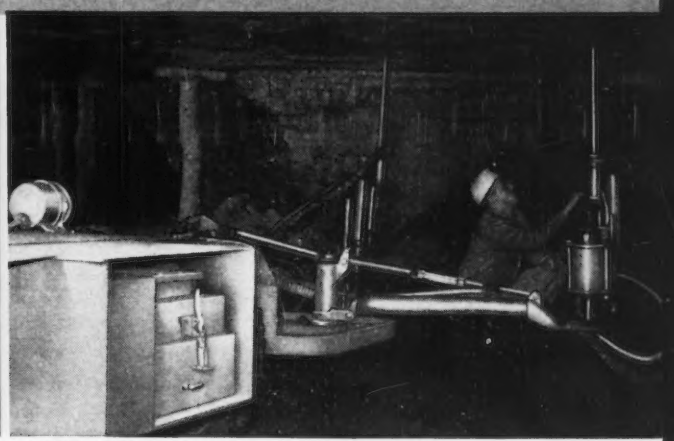
Jumbolter's performance figures show how roofbolting can be the fastest part of the mining cycle, how tonnage is increased and cost-per-ton lowered.

**Revolutionary new dust collectors**

Jumbolters are equipped with LeRoi-Cleveland stopers which feature new tube-type, suction dust collectors approved by the Bureau of Mines. They save time . . . are easy to service. No jacks or arms to set up — no separate units required.



REAR VIEW shows hydraulic-driven cable reel, hydraulic tramming and steering controls. Operator has ample deck room (42" x 42").



SIDE VIEW shows easily positioned stoper arms. Storage space is provided for 150-200 bolts, nuts and plates.

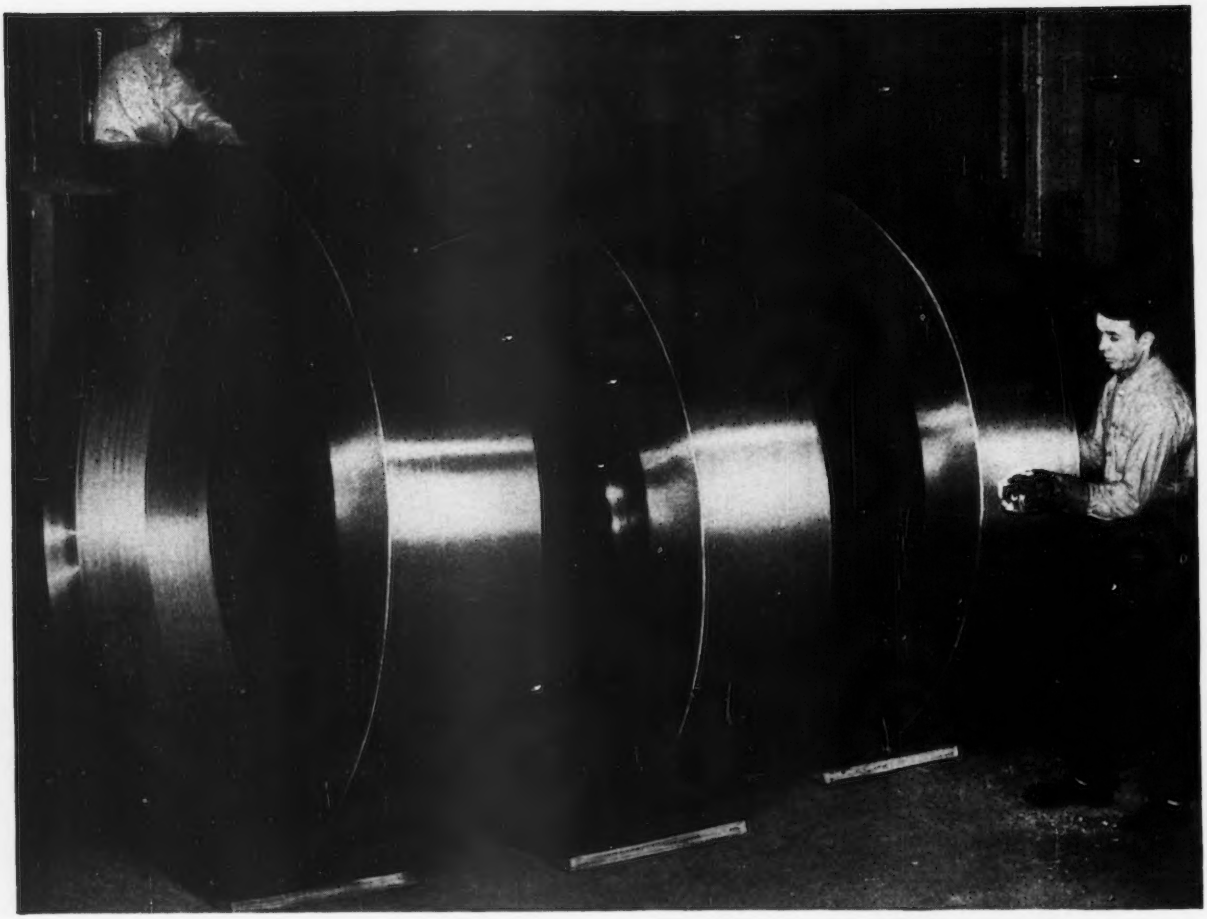
***Write or call today for details on how Jumbolter can triple your roofbolting production.***

**BUREAU OF MINES APPROVED!**

Jumbolter has Burea of Mines Approval Numbers 2-1002 and BM-2515. Overall height of 30" permits bolting of 36" ceilings. Telescoping stopers can bolt 9 foot ceilings. Adopt the LeRoi-Cleveland stopers you now use to the new dust collecting system with a conversion kit. Jumbolter is 178" long, 88½" wide . . . ground clearance is adjustable from 6 to 9".

**ACME Machinery Company**

WILLIAMSON, WEST VIRGINIA • PHONE 2274



# MIDVALE ROLL SHELLS *Stand The Grind*

Tougher, higher resistance to abrasion that "goes down deep" to provide longer service . . . cuts your cost per ton crushed — that describes Midvale Roll Shells.

Midvale Roll Shells combine maximum toughness with remarkable freedom from breakage, and plenty of "bite." Their manufacture is controlled from the ingot to the final machining in Midvale's own plants. We make and shape our own steel for roll shells to stand up and take the toughest wear. The performance records of Midvale Roll Shells in leading mines, smelting companies and quarries prove it.

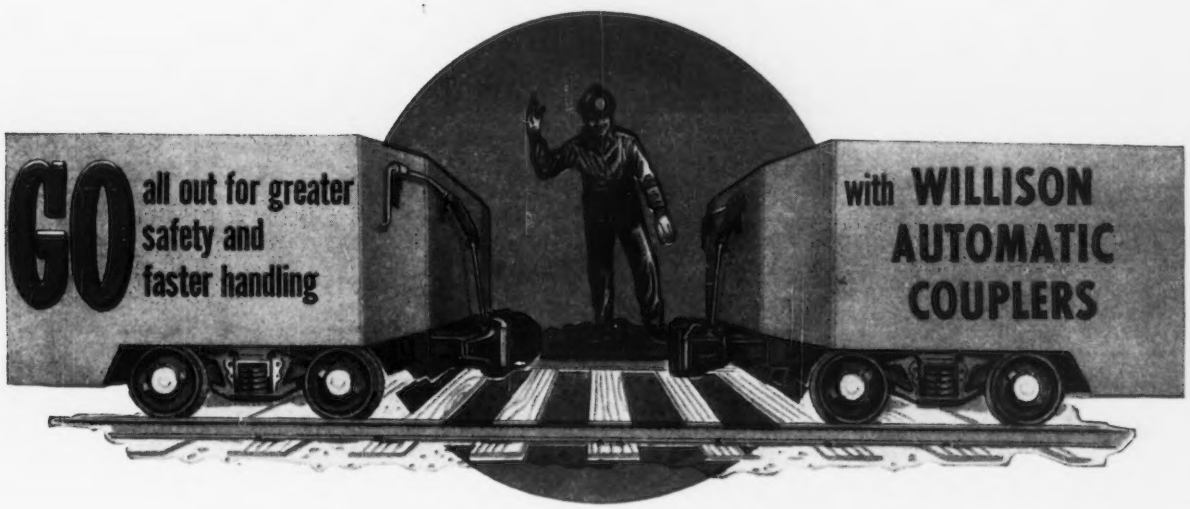
Bring your roll shell and other machinery maintenance problems to Midvale. Let us recommend the best material to save you costly breakdowns . . . to lower your cost per ton crushed.

*THE MIDVALE COMPANY-Nicetown, Philadelphia 40, Pa.*

*Offices: New York, Chicago, Pittsburgh, Washington, Cleveland, San Francisco*

**MIDVALE**

**FORGINGS, ROLLS, RINGS, FLANGES, STAINLESS STEEL CASTINGS**




With Willison Automatic Couplers there's no need for personnel to go between cars to couple or uncouple. That means safety—and faster handling because Willisons uncouple from either side. All Willisons couple with each other automatically—there's no matching of coupler heads.

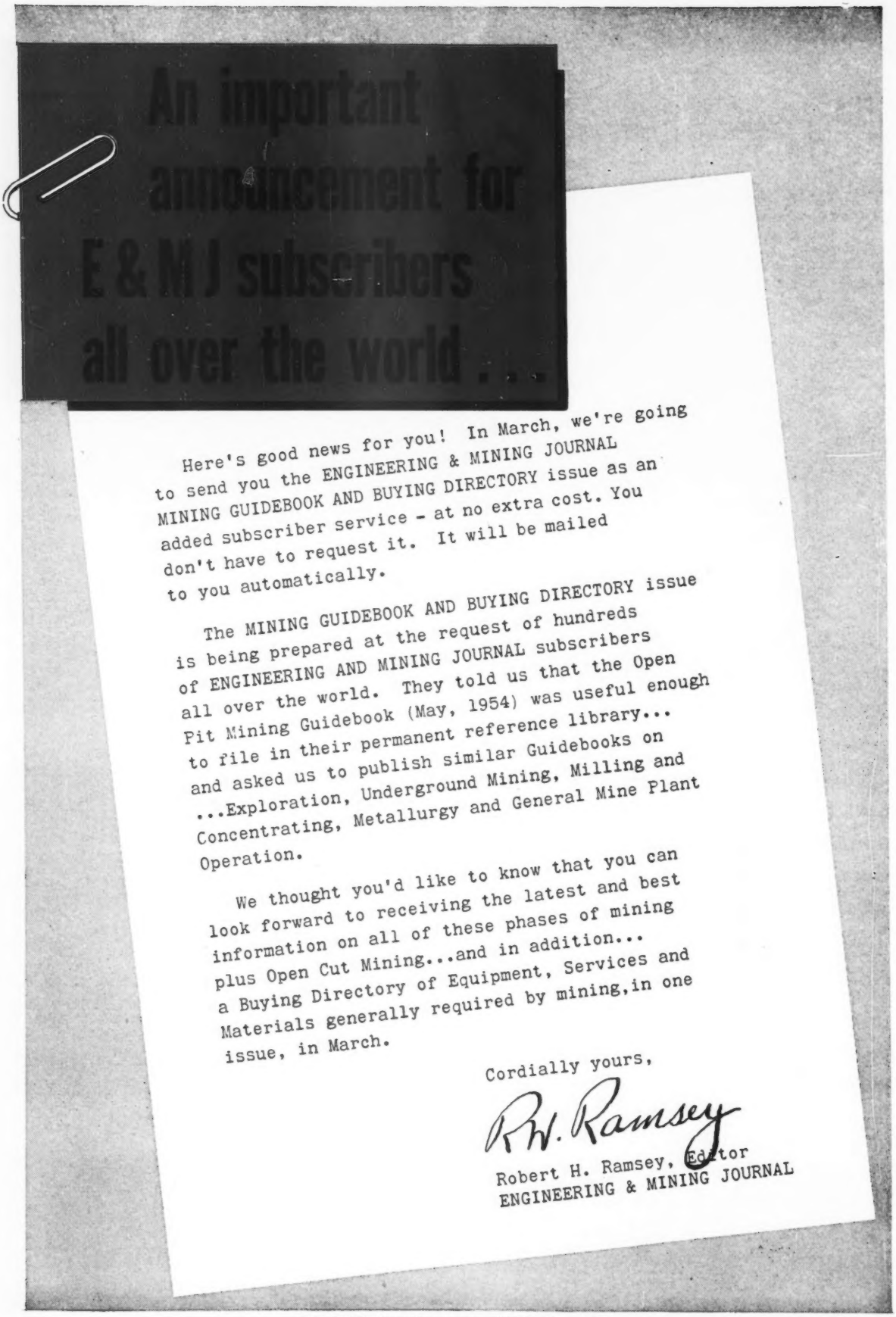
*For safety, faster handling and larger tonnages — Willison Automatic Couplers and National Multi-Pad Rubber Draft Gears.*

A-9031

**NATIONAL MALLEABLE and STEEL CASTINGS COMPANY**

Cleveland 6, Ohio

WILLISON AUTOMATIC COUPLERS • RUBBER & FRICTION DRAFT GEARS • NC-1 CAR TRUCKS
NACO STEEL WHEELS • NACO STEEL LINKS & SWIVEL HITCHINGS


An important announcement for E & M J subscribers all over the world . . .
Here's good news for you! In March, we're going to send you the ENGINEERING & MINING JOURNAL MINING GUIDEBOOK AND BUYING DIRECTORY issue as an added subscriber service - at no extra cost. You don't have to request it. It will be mailed to you automatically.
The MINING GUIDEBOOK AND BUYING DIRECTORY issue is being prepared at the request of hundreds of ENGINEERING AND MINING JOURNAL subscribers all over the world. They told us that the Open Pit Mining Guidebook (May, 1954) was useful enough to file in their permanent reference library... and asked us to publish similar Guidebooks on ...Exploration, Underground Mining, Milling and Concentrating, Metallurgy and General Mine Plant Operation.
We thought you'd like to know that you can look forward to receiving the latest and best information on all of these phases of mining plus Open Cut Mining...and in addition... a Buying Directory of Equipment, Services and Materials generally required by mining, in one issue, in March.
Cordially yours,
R.W. Ramsey
Robert H. Ramsey, Editor
ENGINEERING & MINING JOURNAL

FOR FURTHER DETAILS SEE PAGES 170 and 171

Shovel-loading train of gondolas.

# Crude Sulphur

**for Industrial Use**

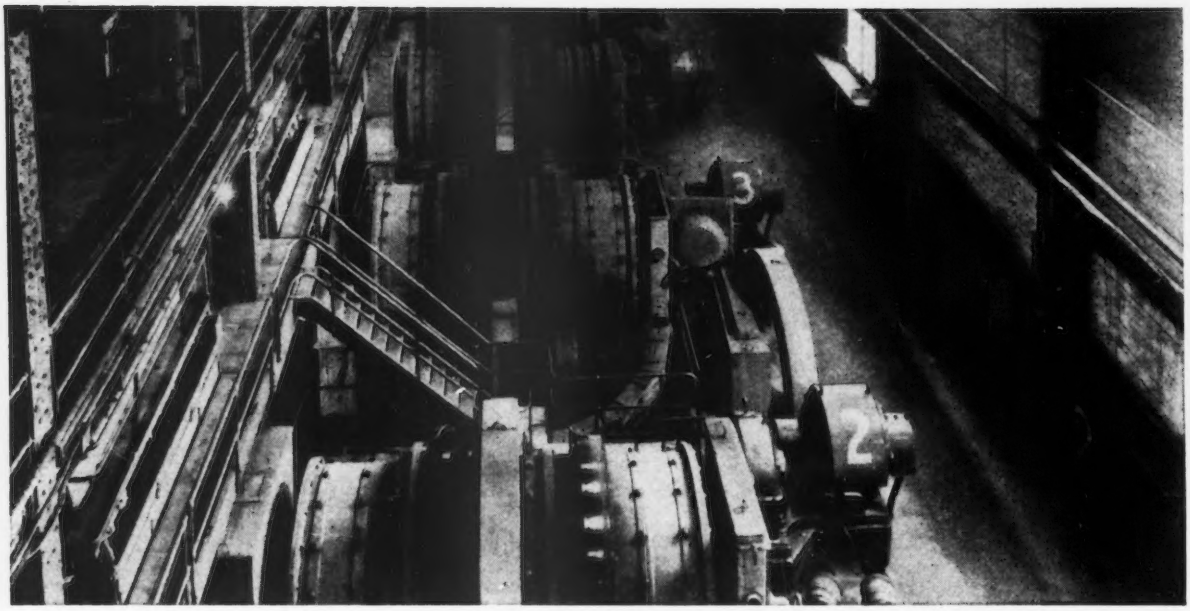
*from the properties of*

## Texas Gulf Sulphur Co.

**75 East 45th Street • New York 17, N. Y.**

*Producing Units*

- **NEWGULF, TEXAS**
- **MOSS BLUFF, TEXAS**
- **SPINDLETOP, TEXAS**
- **WORLAND, WYOMING**



# Our mills...like yours aim for Lower Grinding Costs

Results obtained during actual operations in our Copper Cliff plant show economies you can anticipate for your own mills under like conditions.

**A $300,000 saving** during the past ten years is represented by the following data on liner performance in 6½′ x 15′ open end rod mills (2½″ diameter rods).

Typical figures showing the superiority of Ni-Hard® over manganese steel liners are tabulated:

| | Operating Hours per set liners | Dry tons of ore ground per set | Lbs. of metal used per ton of ore ground |
|---|---|---|---|
| **Ni-Hard** | **12,921** | **541,981** | **.0988** |
| **Manganese steel** | **7,061** | **250,498** | **.1739** |
| **% of Ni-Hard Superiority** | **84.2%** | **116.4%** | **76.0%** |

How long do your grates last? At the Copper Cliff concentrator, illustrated, 6½′ x 15′ Marcy mills using 1½″ Ni-Hard grinding balls are equipped with 54″ diameter Ni-Hard half circular grates. These grates give an average life of 8000 to 9000 hours.

At another INCO concentrator . . . a test on five impellers for 6″ slurry pumps handling rod and ball mill discharge showed the following:

Average life of Ni-Hard . . . . . 846 hours
Average life of white iron . . . . . 449 hours

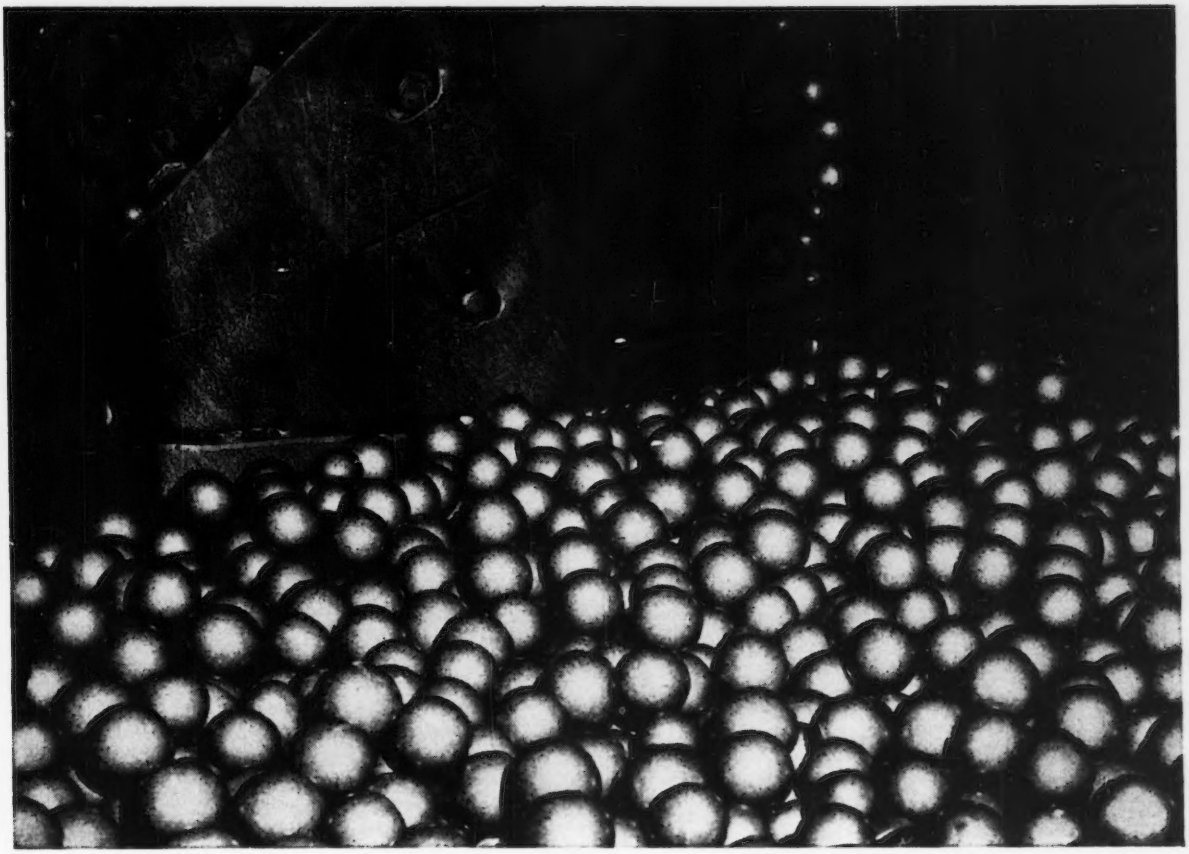
These are typical . . . not exceptional . . . examples. They illustrate the superior abrasion resistance offered by Ni-Hard, and the way it keeps overhead down.

Ni-Hard can also help you the same way it helps us in other applications such as scoop lips, roll crusher feeder and cheek plates, flotation hoods and particularly, grinding balls. If you have abrasion problems, let INCO's experience help you solve them.

The completely revised third edition of "Engineering Properties and Applications of Ni-Hard" is now available. Write for your copy today.

INCO
TRADE MARK

**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET NEW YORK 5, N. Y.



# You Can Cut Costs Here

SHEFFIELD
ARMCO
MOLY-COP
TRADE MARK
COPPER · MOLYBDENUM · ALLOY
GRINDING BALLS

Sheffield copper molybdenum alloy steel grinding balls are manufactured by automatically controlled methods which produce a ball of finer, denser, more uniform structure.

Moly-Cop balls wear evenly and retain their spherical shape longer. They have greater hardness for wear and toughness to resist spalling and chipping. This all adds up to high production rates with less down time, less charging and less power.

Moly-Cop grinding balls can make an important net saving in your grinding cost.

If you have not already proven the value of Moly-Cop balls, get in touch with us before making your next purchase.

**SHEFFIELD STEEL**
DIVISION
ARMCO STEEL CORPORATION
SHEFFIELD PLANTS: HOUSTON KANSAS CITY TULSA

EXPORT REPRESENTATIVES: **ARMCO INTERNATIONAL CORPORATION** · Middletown, Ohio

designers and builders of equipment for basic industries

**IMMEDIATE DELIVERY**

**America's Superior Dryer**

Now you can make fine coal drying a profitable operation with the new McNally "Dryclone". Tested and proven in the field the "Dryclone" can be operated for a few cents per ton and give a product with a delivered surface moisture as low as 5% depending upon sieve analysis and feed rate of coal to be dried.

For Basic Industries McNally Pittsburg offers:

* SERVICES *

Engineering Design — Field Erection
Research & Development

* EQUIPMENT *

Conveyors — Pug Mills
Crushers — Screens
Dryers, Centrifugal and heat. — Pumps, Valves, Piping
Washers, heavy media and jig — Car Hauls, Dumpers
Kilns

McNALLY PITTSBURG
MANUFACTURING CORPORATION

* OFFICES *

Pittsburgh, Pa. — First National Bank Bldg.
Chicago, Illinois — 307 N. Michigan

* PLANTS *

Pittsburg, Kansas — Wellston, Ohio

**Built for tough service and fast work**

DFC **LABORATORY CRUSHERS** combine features which insure efficient operation, low maintenance, ease of cleaning, extra long service life. Large and small sizes offered — hand, belt, or motor drive models. Approximate capacities: 150 to 360 pounds per hour.

*WRITE FOR BULLETIN*

DFC
The DENVER FIRE CLAY Company
2301 BLAKE STREET • DENVER COLORADO
SALT LAKE CITY • EL PASO • ALBUQUERQUE

Kennametal* Carbide-Tipped prospectors' hand drills

**STAY SHARP LONGER**—50 to 100 times longer than the best alloy steel bits. Less sharpening necessary. You carry fewer drills.

**EASIER—FASTER TO USE**—Kennametal Carbide Tips have the greatest wear and shock-resistance of any metal in commercial use.

**SIZES AND PRICES**—Available in two standard sizes: 18-inch length for 1¼ inch holes and 24-inch length for 1⅛ inch holes. Price: $9.00 each. Other sizes quoted upon request. Write KENNAMETAL, INC., Mining Tool Division, Bedford, Pa. **Reg. TM*

INDUSTRY AND KENNAMETAL: PARTNERS IN PROGRESS

KENNAMETAL Bedford, Pa.

If there is

**something you want . . .**

that other readers of this paper can supply

or —

**something you don't want . . .**

that other readers can use, advertise it in the

**SEARCHLIGHT SECTION**

(Classified Columns)
of this paper

**CORE DRILLING**

*"We look into the Earth"*

—anywhere!

- Mineral Prospecting
- Foundation Test Borings and Grouting
- Large diameter holes for Ventilation and Escapeways

PENNSYLVANIA Drilling CO.

DRILLING CONTRACTORS & MFRS.

1205 Chartiers Ave. PITTSBURGH, PA. WAlnut 1-5816

**ALLUVIAL DEPOSITS**

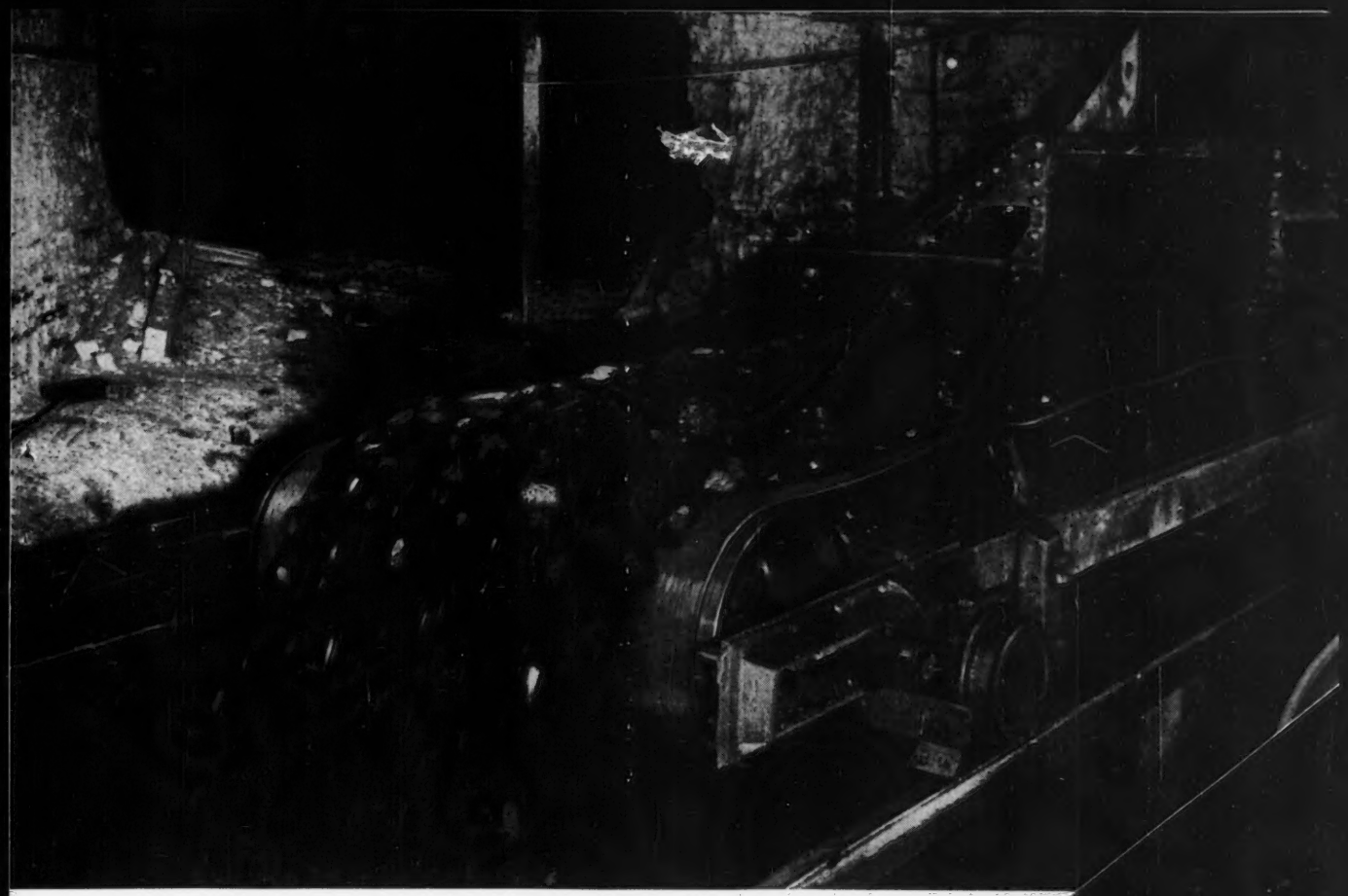
**Gold Tin Columbite Titanium Bauxite**

Most accurately and economically tested for . . . with the

**EMPIRE DRILL**

NEW YORK ENGINEERING COMPANY

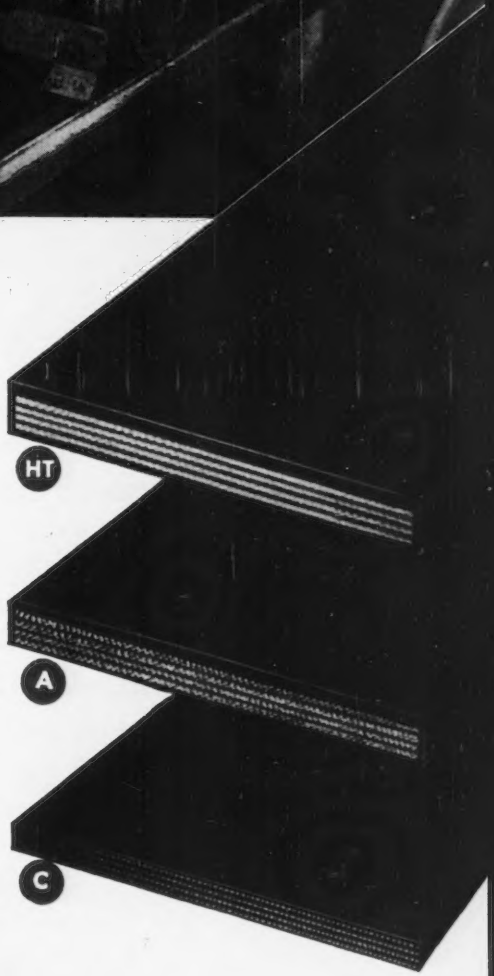
75 West St., N. Y. City, U.S.A. Cable Address NYECO, N.Y.



## Thermoid Conveyor Belting cuts handling costs on rugged mining jobs

There's a Thermoid Conveyor Belt designed to lower your handling costs on every mining job. Here are three examples: HT —For extremely abrasive materials such as coal, granite, trap rock, flint rock, quartz ore; A —For slag, lime rock, crushed stone and other highly abrasive materials; C —For moderate abrasives such as sand, loam, soda, gravel.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life . . . lower your handling costs per ton. Your Thermoid Distributor carries a complete line of Thermoid Conveyor Belting, Multi-V Belts and Hose to meet the most severe requirements of any mining operation. Call him or write direct for full information.




Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

**Thermoid**

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

Made Tougher to Last Longer—

CHESTER plasticord-plasticote® WIRES & CABLES

CHESTER SHOT FIRING CABLE

- Resists sharp edges and abrasion
- Flame retarding, waterproof
- Non-Decaying, non-aging
- High strength, extra flexibility
- Non-cracking from −40°C to +80°C
- Resists most alkalies, acids, oils, greases
- Immune to ozone and sunlight

Nylon jacket over center core makes this Chester Cable super-durable. Withstands sunlight and ozone, dragging over abrasions and sharp edges and extremes of temperature will not crack it. This cable is highly flexible, completely waterproof . . . lasts for years in mine service. For complete specifications and samples of Chester wire for mine service, write today.

MINE-SERVICE TELEPHONE WIRE
Flame-retarding, non-decaying and waterproof. Resists acids, extreme temperatures and offers high tensile strength.

NEW IMPROVED BLASTING WIRE
Waterproof construction with high mechanical strength. Covering is flame retarding. Extra dependable.

"Chesty" says—KEEP YOUR POWDER DRY AND FIRE IT WITH CHESTER!

CHESTER CABLE CORP
CHESTER, NEW YORK



ADDITIONAL PROFIT
12 CENTS PER TON
AT NO EXTRA COST WITH

THE BOOTH FLOTATION CELL

AN IMPORTANT MINE OPERATOR REPORTS THIS EXTRA PROFIT IN THE TREATMENT OF A SULPHIDE ORE.

—STEP OUT IN FRONT WITH BOOTH—

COMPLETE ORE TESTING FACILITIES
— SHIP US YOUR PROBLEMS —
EXPERIENCE COVERS ORES FROM EVERY IMPORTANT MINING DISTRICT IN THE WORLD

the BOOTH company
• INCORPORATED •
333 West 14th South St., Salt Lake City 4, Utah

MINERALS SEPARATION • MANUFACTURE • EQUIPMENT



A tip for top performance

TeeCee
TUNGSTEN CARBIDE

&

"TYPE L"
ONE PASS STEEL

LIDDICOAT

DETACHABLE
DRILL BITS

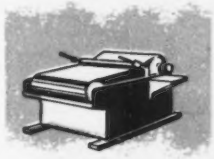
MANUFACTURED BY
Thompson Products
THOMPSON PRODUCTS LTD. • ST. CATHARINES, ONT.

# WET CONCENTRATION?

. . . magnetic concentration of magnetite, magnetic taconite, roasted limonite or hematite? Recovery of medium in a heavy media plant? Preliminary purification of dredged or beach sands?

If these are your problems, you'll want to talk to the Dings people about Wet Concentration. Learn the reasons for, and the operation of, Dings wet belt and wet drum magnetic separators, both electric and non-electric Alnico types—and learn about the new Dings super high intensity models with nearly double the capacity of older units. *Call or write for further information.*

DINGS DRUM TYPE SEPARATORS



DINGS TYPE HM SEPARATOR

**Dings**

**DINGS MAGNETIC SEPARATOR CO.**
**4716 W. ELECTRIC AVE., MILWAUKEE 46, WISCONSIN**

Wet and Dry Concentrators . . .
Tramp Iron Magnets . . .
Magnetic Detectors . . .
Magnetic Tube Testers . . .
Magnetic Drill Extractors . . .
Laboratory Separators

WC154

*Magnetic Separation Leader for over Fifty Years*

# Professional Services

ASSAYING
CONSULTING
PROSPECTING
ORE TESTING

RESEARCH
METALLURGY
MILL DESIGN
MINE MANAGEMENT

**AGENCE MINIERE & MARITIME S.A.**
Sworn weighers, samplers & Assayers of Ores, Metals. Representatives of shippers at European ports & Works. *Market surveyors and commercial advisers assuring sales direct to consumers*
2, rue Van Bree, Antwerp, (Belgium)

**READERS MAY CONTACT THE CONSULTANTS**
*Whose Cards Appear on This Page*
with the confidence justified by the offerings of these special services nationally.

**ROGER V. PIERCE**
*Mining Engineer Specialist*
Underground Mining Methods. Cost Cutting Surveys—Production Analysis Mine Mechanization—Mine Management.
1596 Wasatch Dr., Salt Lake City, Utah

**BEHRE DOLBEAR & COMPANY**
Consulting Mining Engineers and Geologists
11 Broadway, New York 4, N. Y.

**E. LEE HEIDENREICH, JR.**
*Consulting Engineers*
Crushing Plants — Quarries
Milling Plants — Plant Design
Plant Layouts — Appraisals
75 Second St., Newburgh ,N. Y.
9 So. Clinton St., Chicago 6, Ill.

**E. J. LONGYEAR COMPANY**
*Geological and Mining Consultants*
Exploration and appraisals of metallic and non-metallic mineral deposits
Photogeology
Foshay Tower — Minneapolis, Minn.

**LUCIUS PITKIN INC.**
*Mineralogists—Assayers*
*Chemists—Spectroscopists*
SHIPPERS REPRESENTATIVES
Main Office—Laboratories
Pitkin Bldg.—47 Fulton St.
New York 38, N. Y.

**BLANDFORD C. BURGESS**
*Consulting Engineer*
Industrial Mineral Specialist
Appraisals — Mineral Surveys
Plant Design
Prospecting Development — Efficiency
Ground Water Studies
Box 350 — Monticello, Ga.

**HERON ENGINEERING CO.**
Consulting Engineers for all types of Aerial Tramways, Cableways, and Suspension Structures
200 South Acoma St.
Denver 19, Colorado

**ROBERT S. MAYO**
*Civil Engineer*
Complete Equipment for Concrete Lining of Tunnels, Haulageways and Shafts. Special Equipment for Underground or Subaqueous Construction.
Lancaster, Penna.

**SMITH-EMERY CO.**
*Assayers and Chemists*
SPECTROGRAPHIC ANALYSES
781 E. Washington Blvd.
Los Angeles 21, Calif.

**COWIN & CO., INC.**
*Mining Engineers and Contractors*
Consulting—Appraisal—Reports
Shaft & Slope Sinking
Mine Development
Mine Plant Construction
1-18th St. S. W. Birmingham, Ala.
Phone 56-5566

**ALBERT P. E. HOPKINS**
**P. Eng.**
*Consulting Mining Geologist and Engineer*
1320-1730 Bank of Commerce Bldg.
Toronto 1, Canada
EM 4-5642, HU 9-8375

**ARNOLD H. MILLER**
*Consulting Engineer*
General Mine, Mill and Industrial Appraisals
Plant Design, Mechanization and Improvement
Cable: "ALMIL." Tel. Cortland 7-0635
120 Broadway, New York 5

**H. L. TALBOT**
*Consulting Metallurgical Engineer*
Extraction and Refining of Base Metals
Specializing in Cobalt and Copper
Room 331, 84 State St.
Boston 9, Mass.

**DICKINSON LABORATORIES**
*Assayers—Chemists—*
*Metallurgists—Umpire Work*
Ore Shippers Representatives at Local Plants
Samplers - Analysts at Mexican Border Points
1300 West Main St. — El Paso, Texas

**V. CALIBORNE KILBY**
*Chemist*
Ore Analysis
Milton — N. C.

**ARTHUR NOTMAN**
*Consulting Mining Engineer*
55 Liberty St., 18th Floor
New York 5, N. Y., U.S.A.
Telephone BArclay 7-9484

**GODFREY B. WALKER**
*Metallurgical Consultant*
Mineral Dressing, Extractive Metallurgy
Heavy Media a Specialty
37 Lockwood Drive
Old Greenwich, Conn.

**GEO-RESEARCH**
Geology — Geophysics — Mineralogy
*Consultants*
A Division of the
Institute of Industrial Research
Syracuse 10, N.Y., Phone: 6-6454

**KELLOGG KREBS**
*Metallurgical Engineer*
Mineral Dressing Consultant
564 Market St. — Telephone:
San Francisco 4, Calif. — SUtter 1-6613

**RODGERS PEALE**
*Consulting Mining Geologist*
315 Montgomery Street
San Francisco 4, Calif.

**HARRY J. WOLF**
*Mining and Consulting Engineer*
Examinations — Valuations — Management
One Park Place
New York 7, N.Y.
Cable: MINEWOLF
REctor 2-5307

**ABBOT A. HANKS, INC.**
ASSAYERS—CHEMISTS
Est. 1866
Spectrographic Analysis
Shippers Representative
624 Sacramento Street
San Francisco 11

**LEDOUX & COMPANY, Inc.**
Metallurgical Chemists — Assayers
Spectroscopists
Representatives of Shippers of Ores and metals at Buyers Works
Mine Examination Analyses
359 Alfred Ave., Teaneck, N. J.

**AMEDEE A. PEUGNET**
*Consulting Mining Engineer*
Telephone MAin 1-1431
705 Chestnut St., St. Louis 1, Mo.

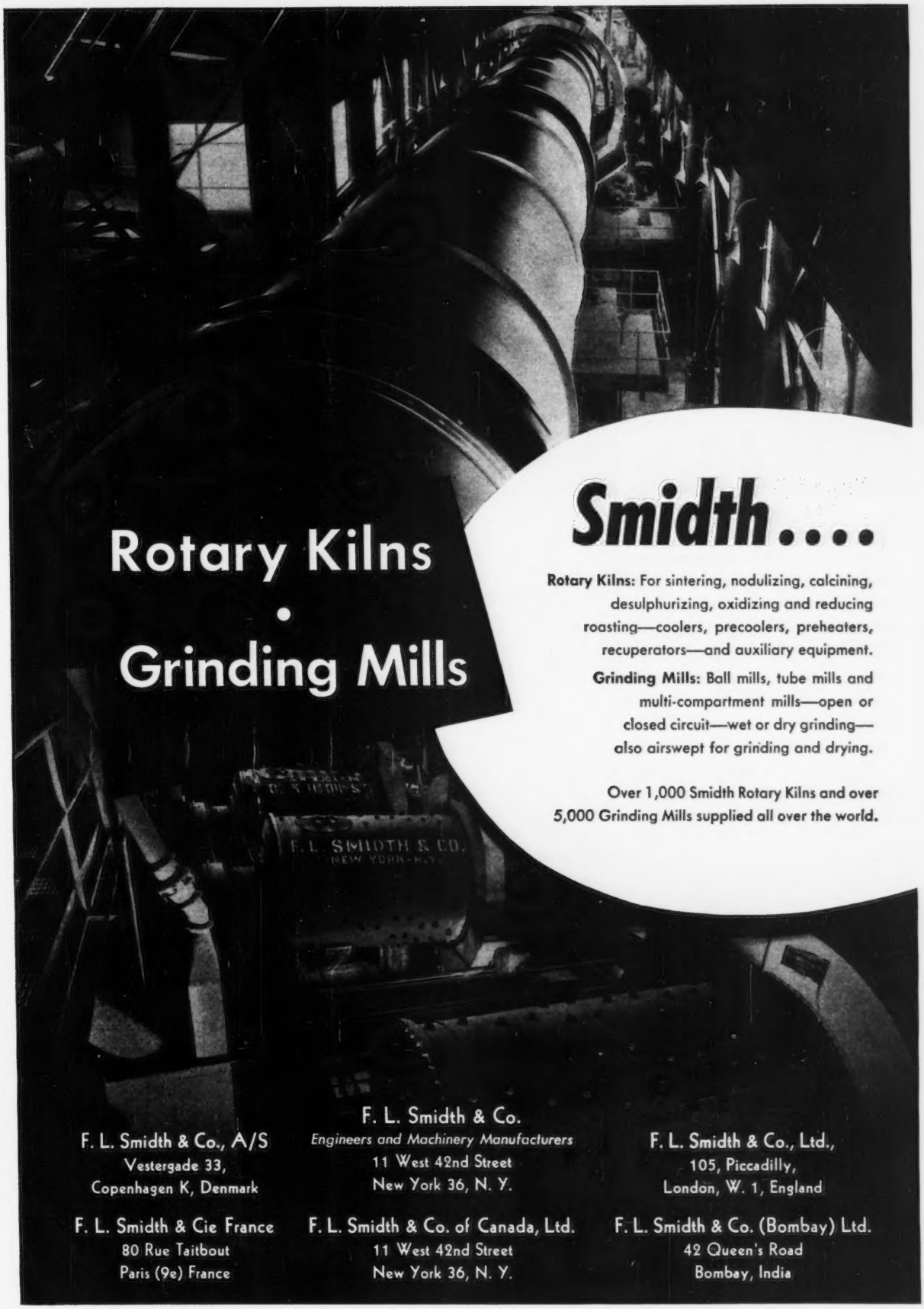
**WORLD MINING CONSULTANTS, INC.**
*Consulting Mining Engineers and Geologists*
220 Broadway, New York 38, N. Y.
WOrth 2-2934

## Call in a SPECIALIST to solve that problem...

Experiment takes time—so why not save time by calling in a specialist who has already gone over the ground you are now exploring?

Engineering & Mining Journal, the meeting place of mining men in all parts of the country, points the way to the solution of many mining problems through its Professional Service Section.

Why not tell one of these specialists about YOUR problem?




# Rotary Kilns • Grinding Mills

## Smidth....

**Rotary Kilns:** For sintering, nodulizing, calcining, desulphurizing, oxidizing and reducing roasting—coolers, precoolers, preheaters, recuperators—and auxiliary equipment.

**Grinding Mills:** Ball mills, tube mills and multi-compartment mills—open or closed circuit—wet or dry grinding—also airswept for grinding and drying.

Over 1,000 Smidth Rotary Kilns and over 5,000 Grinding Mills supplied all over the world.

F. L. Smidth & Co., A/S
Vestergade 33,
Copenhagen K, Denmark

F. L. Smidth & Co.
*Engineers and Machinery Manufacturers*
11 West 42nd Street
New York 36, N. Y.

F. L. Smidth & Co., Ltd.,
105, Piccadilly,
London, W. 1, England

F. L. Smidth & Cie France
80 Rue Taitbout
Paris (9e) France

F. L. Smidth & Co. of Canada, Ltd.
11 West 42nd Street
New York 36, N. Y.

F. L. Smidth & Co. (Bombay) Ltd.
42 Queen's Road
Bombay, India

# HOW ARE YOUR COMMUNICATIONS ?

Do the booklets, pamphlets, and manuals you use really *work* for you? Are these vital publications, that tell the story of your products and your company, as effective, readable, well designed and illustrated as they can be? Today more than ever, your entire operation is judged by each annual report, employee manual, and public relations piece that you produce. Have you examined your communications lately? If you have any doubt as to the impact of your instructional and promotional literature, remember . . .

## COMMUNICATION IS OUR BUSINESS

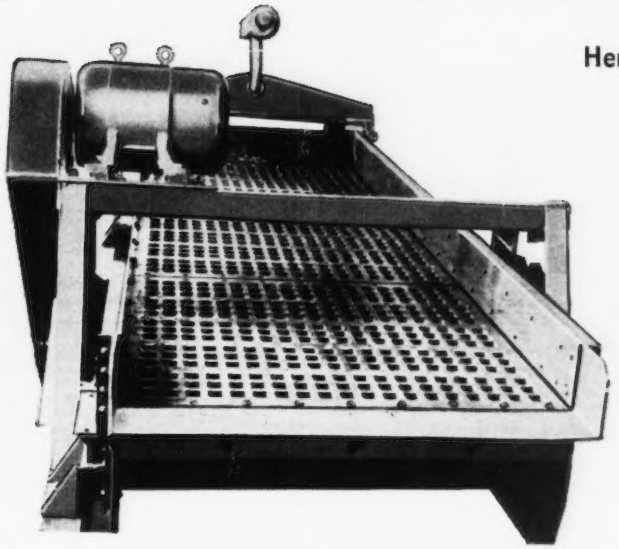
For a good many decades McGraw-Hill has stood for complete coverage in the business literature field. Now the McGraw-Hill TECHNICAL WRITING SERVICE offers a new approach to your publication problems — an *integrated* writing, editing, illustrating, and printing service for the *custom* production of: INSTRUCTION MANUALS, PRODUCT BULLETINS, TRAINING AIDS, INDUSTRIAL RELATIONS LITERATURE, ANNUAL REPORTS, COMPANY HISTORIES, PROCEDURAL GUIDES and other collateral literature. More than 150 editorial and graphic experts are at your disposal, ready to prepare high-quality material to your own or government specifications. Save time, save money . . . and make your communications work! Let *our* staff be your staff for technical and business publications.

## McGraw-Hill Book Co. TECHNICAL WRITING SERVICE

Write or phone Technical Writing Service, McGraw-Hill Book Co., Inc.
330 West 42nd Street, New York 36, N. Y. • LOngacre 4-3000

*This service is available through ad agencies.*

# Takes Rough Treatment in its Stride

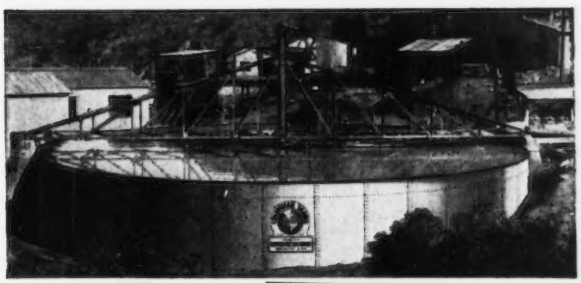


Hendrick Perforated Metal Plate takes the knocks and bruises of constant heavy-duty screening without altering uniformity of material. Because the holes can not stretch, Hendrick Perforated Plate assures large quantity screening without expensive, time-wasting blinding. Supplied either flat or corrugated, Hendrick Perforated Metal is available in any desired shape and size of openings in high carbon, stainless steels and in other commercially rolled metals. Write for further details — or phone Hendrick direct.

SEE OUR CATALOG IN SWEET'S

**Hendrick**
MANUFACTURING COMPANY
70 DUNDAFF STREET, CARBONDALE, PA.
*Sales Offices in Principal Cities*

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids



QUICK SHIPMENT **COLUMBIAN BOLTED STEEL MINING EQUIPMENT**

**AGITATORS • THICKENERS • SOLUTION TANKS • ORE BINS, ETC.**

No costly delays. Your order is handled in record time by an expert staff of engineers and designers. Then it is fabricated in one of the best equipped manufacturing plants in the Mid West, with modern presses especially designed for the purpose.
Lower your costs with Columbian Mining Equipment for permanent installation, yet portable if change in location is necessary. Standard construction for domestic use or for export by ocean freight. Special if for export via mule-back or aeroplane to final destination. Order from distributors listed below—or write direct for complete facts.

**COLUMBIAN STEEL TANK CO.,**
P. O. Box 4048-D, Kansas City, Mo.

Distributors in the United States

Denver Equipment Company, 1400 Seventeenth Street, Denver, Colorado
Elmco Corporation, 634 South 4th West Street, Salt Lake City, Utah

Distributors — Foreign

Avenida Ejercito Nacional 458-D Colonia Chapultepec Morales, Mexico, D. F.

# You SET THE SPECIFICATIONS

Special 4 x 6 Steam Fixed Drum Winch. Duty single line pull 4,300 lbs. at 90 FPM.

Superior-Lidgerwood-Mundy has the facilities and experience to meet them . . . either from an all-inclusive line of standard hoisting equipment or with equipment engineered to your specific requirements.

*WRITE FOR BULLETINS AND CATALOGS*

**SUPERIOR-LIDGERWOOD-MUNDY CORPORATION**
Main Office and Works: SUPERIOR, WISCONSIN, U.S.A.
New York Office, 7 Dey Street, New York 7, N. Y.

## UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG CHAMBER OF MINES CHAIR OF MINING ENGINEERING

Applications are invited for appointment to the post of Professor in Mining Engineering who will be head of the Department of Mining.

The substantive salary attached to the post will be as arranged between the successful applicant and the University, but will not be less than £3,000 per annum. In addition, a married man will receive cost of living allowance at such rate as may be authorized from time to time; the present rate being £234 per annum.

Membership of the University Institutions Provident Fund is compulsory and involves a contribution of 7% of the pensionable salary, the Government and the University together contributing an equal amount.

The pensionable salary is at present £1600 per annum. Membership of the University's Staff Medical Aid Fund is also compulsory in the case of an officer who is eligible for such membership, and contributions will be in accordance with the rules of the Fund.

The Professor will be called upon as part of his duties to serve as a Consultant to the Transvaal and Orange Free State Chamber of Mines. He will not, except under special circumstances, be granted permission to engage in private consultative work.

Duties are to be assumed on the 1st July, 1955, or as soon as possible thereafter. Applicants are advised to obtain the information sheet giving more details in regard to this vacancy from the Registrar, University, Milner Park, Johannesburg, South Africa, with whom applications should be lodged not later than the 31st January, 1955.

## SENIOR METALLURGIST

**Applications are invited from experienced Metallurgical Engineers for a senior position at the Nkana Smelter of Rhokana Corporation, Limited, at Kitwe, Northern Rhodesia.**

**The applicant must have had considerable experience, an appreciable part of which should have been in the pyrometallurgy of copper and preferably include the operation of reverberatory type furnaces.**

**A thorough knowledge of sampling and sample preparation of ores, concentrates and smelter products is needed.**

**Interest and competency in both metallurgical development and control of plant processes is needed.**

**The salary to be offered will be commensurate with the successful candidates qualifications and experience with the minimum of £1,500 per annum. There is a cost of living allowance of £5.10.0 at present and a copper bonus, based on the difference between the cost of production and the selling price of copper, and at present 60% of basic salary, is paid monthly. Housing is provided, with basic furniture, at a nominal rental. The Corporation will pay the cost of first-class transportation for the successful candidate and his immediate family, including children up to the age of 18 years, to Kitwe, Northern Rhodesia.**

**Applications stating age, marital status, qualifications, experience, record and availability should be addressed to: The General Manager, Box 137, Kitwe, Northern Rhodesia.**

## MINE SUPERINTENDENT

**Exceptional opportunity for very hard-working mining engineer with strong interest in geology 30 to 40 yr. old with demonstrated supervisory ability and experience particu'arly underground mining methods for work at mine operated by chemical company to insure mercury supply. Write fully, including photograph, resume of college records, experience and references to Dr. S. J. Buckman,**

**Buckman Mines**
**Geyser Road, Cloverdale, California**

# SEARCHLIGHT SECTION

*(Classified Advertising)*

EMPLOYMENT: BUSINESS: **"OPPORTUNITIES"** :EQUIPMENT :USED OR RESALE

**UNDISPLAYED —RATES— DISPLAYED**

$1.20 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.
*Position Wanted* undisplayed rate is one-half of above rate, payable in advance.
*Box Numbers* in care of our New York, Chicago & San Francisco offices count as one additional line.
*Discount of* 10% if full payment is made in advance for 4 consecutive insertions.

*Equipment Wanted or For Sale Advertisements* acceptable only in Displayed Style.
*Individual Spaces* with border rules for prominent display of advertisements.
The advertising rate is $12.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.
*An advertising inch* is measured 7/8" vertically on one column. 3 columns—30 inches—to a page.

Send New Ads to N.Y. Office, 330 W. 42nd St., N.Y. 36, N.Y., for Dec. issue closing Nov. 19th

## ORE DRESSING-MINERALOGIST

**Engineer for research and development in Ore Processing, primarily nonmetallics. Experience in mineral identification desired. Salary commensurate with experience. Location — Florida.**

**P-4409 Engineering and Mining Journal**
**330 W. 42nd St., N.Y. 36, N.Y.**

*REPLIES (Box No.): Address to office nearest you*
*NEW YORK: 330 W. 42nd St. (36)*
*CHICAGO: 520 N. Michigan Ave. (11)*
*SAN FRANCISCO: 68 Post St. (4)*

### POSITION VACANT

WANTED. SAFETY and Ventilation Engineer. Minimum age 35. Experience in underground metal mining essential. Capable of making mine ventilation surveys and promoting mine safety program. Salary $5500 to $6000 depending upon qualifications. P-4212, Engineering & Mining Journal.

### POSITIONS WANTED

MINING ENGINEER. Manager or Assistant. 40, married, three children. Broad experience all phases exploration, development, operation, and administration with large mining companies in South America since 1936. Reliable organizer and producer. Versatile engineering designer. Fluent Spanish. PW-3669, Engineering & Mining Journal.

SUPERINTENDENT, E.M. 56. General — Mill —mine, for abroad. Progressive—efficient—reliable — loyal — Spanish — Correspondence invited. PW-3658, Engineering & Mining Journal.

MINING ENGINEER 25 years Successful and Progressive Foreign and Domestic Mining Operations. Available as Manager or Superintendent. PW-1622, Engineering & Mining Journal.

MINERAL DRESSING Engineer, 33, B.S. Min. Eng., M.S. Min. Dress. Eng., single, 5 years experience underground mining, 2½ years mineral dressing examinations on all types of ores including cost appraisal and plant design. Desires employment in mineral dressing testing. Would consider plant control work. Employed. Available reasonable notice. PW-4294, Engineering & Mining Journal.

CHEMIST ANALYTICAL, woman, age 29, metals, minerals expert assayer, 3 years experience, graduated in Germany and USA. PW-4275, Engineering & Mining Journal.

MINING ENGINEER—33, married. Varied experience underground and open pit, U.S., Canada and South America. Wants South American position. Presently employed. PW-4419, Engineering & Mining Journal.

## MINING MILL DESIGN & CONSTRUCTION

**Mature Engineer with broad background of administrative and mining experience. Twenty years in actual design and construction of mining mills.**

**Graduate mining engineer, Registered mechanical engineer, experienced structural engineer. Experience covers all phases of plant construction, including design, purchasing, accounting, labor relations, etc.**

**Member AIME. Excellent references.**

**PW 4276 Engineering & Mining Journal**
**520 N. Michigan Ave., Chicago 11, Ill.**

### POSITIONS WANTED

MINING ENGINEER, Canadian, 20 years varied mine operation, development. Successful manager and consultant. Desires senior operating or advisory position. PW-4229, Engineering & Mining Journal.

YOUNG MINE Superintendent—will guarantee maximum production, plus efficient management of any prospective property. Can offer—Modern methods in various types and phases of mining, full organizing, construction, developing of all surface and underground operations, have knowledge of sorting, grading, milling of ores, experienced in both Canadian and American mining. Available to all countries on notice. PW-4198, Engineering & Mining Journal.

MINING ENGINEER, 31, B.S. licensed Professional Engineer experienced in mining and construction, bilingual (English-French), desires foreign position, preferably development. PW-4209, Engineering & Mining Journal.

MANAGER AVAILABLE Exceptional ability and character, E.M., 35 years experience exploration, production, labor problems and contracts, fluent Spanish, manager of large properties. PW-4473, Engineering & Mining Journal.

MINING ENGINEER. Age 28, experience in mineral exploration and development, tunnel construction; practical mining experience. Presently employed outside U.S. Desire position western U.S. Available end of 1954. Correspondence invited. PW-4464, Engineering & Mining Journal.

### SELLING OPPORTUNITY WANTED

WANTED: FIRST class firms in U.S.A. for sale of special range of modern machinery screening means, conveyor belts and other specialties for the mining industry. For full particulars, address: N. V. Tema, The Hague (Holland), Nassaulaan 1.

### BUSINESS OPPORTUNITIES

Available, large acreage containing uranium, monazite, zirconium, and thorium; also gold copper values; also surface deposit containing titanium rutile. E. F. Schultz, P. O. Box 384, Yerington, Nevada.

Two mica mines for sale or lease. Located in Alabama. P. O. Box 373, Sylacauga, Alabama.

**We Specialize in Buying Complete Mining, Milling or Construction Plants**

**We have purchased 14 within three years. Please contact us before you sell.**

**BO 5701 Engineering & Mining Journal**
**520 N. Michigan Ave., Chicago 11, Ill.**

**BUYER WITH CASH**

**Want industrial plants. Will arrange thru purchase of (1) capital stock, (2) Assets, (3) Machinery and equipment, whole or part. Personnel usually retained, strict confidence.**

**Box 1351**
**Church Street Station, New York 8, N. Y.**

## FOR SALE

**Seventy ton modern cyanide plant, two 125 KVA diesel driven generators, assay office, air locomotive, mucking machine, portable 315cf diesel compressors, slusher hoists etc., in excellent condition.**

**SUMMIT KING MINES, LTD.**
**FALLON, NEVADA**

# SINCE 1898 DEPENDABLE RECONDITIONED MACHINERY

### LOCOMOTIVES

1—2-2½ ton Whitcomb Battery, 24" gauge
1—2½ ton Jeffrey battery or trolley, 36" gauge
1—3½ ton Mancha battery, 25" gauge, with 2 sets Edison batteries and charging set
1—3½ ton Mancha battery, 24" gauge
1—4 ton Westinghouse battery, 24" gauge
1—4 ton Ironton battery, 36" gauge
2—7 ton General Electric permissible battery 36" gauge
1—7 ton Atlas battery, 36" gauge
3—8 ton Ironton battery, 36" gauge
2—8 ton General Electric battery, 36" gauge
4—10 ton Atlas battery, 36" gauge
1—10 ton Atlas battery, 36" gauge
1—4½ ton Goodman trolley, 36" gauge
1—5 ton Jeffrey trolley, 36" gauge
3—8 ton Ironton battery, 36" gauge
2—8 ton Goodman trolley, 36" gauge

### FILTERS

1—3' x 3' Drum Filter
2—4' x 2' Morse Drum Filters
1—6' 2-disc American Filter
1—6' 3-disc American Filter
1—18" Morse Round Pattern Filter Press
1—36" Merrill Triangular Filter Press
1—#12 Sweetland Filter Press, 36 leaves

### FLOTATION MACHINES

1—New Morse Jetair 2 cell #7
1—29 x 7 Fagergren Single Cell
1—6 cell 18" Stearns-Roger
2—6 cell Denver "Sub A" #21
1—6 cell new Morse "Jetair" #7
1—New Morse Jetair 6 Cell #30

### DIAPHRAGM PUMPS

3—2" New Morse Diaphragm Pumps
2—4" New Morse Diaphragm Pumps
1—2" Dorrco Duplex Pump
1—4" Dorrco Duplex Pump
1—4" Barnes Pump
2—4" Butchart Pumps
1—4" Dorrco Pressure Diaphragm Pump

## RECONDITIONED MACHINERY CATALOG 541 E JUST PUBLISHED. SEND FOR FREE COPY

### BALL & ROD MILLS

1—4' x 3' Marcy Ball Mill
1—4' x 3' Marcy Ball Mill
1—4' x 4' Marcy Ball Mill
2—6' x 48" Hardinge Conical Ball Mills with air-swept equipment
1—8' x 22" Hardinge Conical Pebble Mill
1—3' x 8' Marcy Rod Mill
1—3' x 9' Ruth Rod Mill

### PORTABLE COMPRESSORS

1—105 CFM Ingersoll Rand Portable Driven by 4 Cylinder Gasoline Engine
1—210 Worthington "Blue-Brute" Portable Driven by Continental 6 Cylinder Gasoline Engine
1—230 CFM Gardner-Denver Compressor, Model WBQ, driven by Buda 6 cylinder gasoline engine, skid mounted
1—240 CFM Schramm Portable Driven by Buda 4 Cylinder Gasoline Engine
2—310 CFM Gardner Denver Driven by Buda 4 Cylinder Gasoline Engine
1—310 CFM Sullivan Driven by Buda 4 Cylinder Gasoline Engine

### FEEDERS

1—12" x 6' New Morse "Vari-stroke" Ore Feeder
2—12" New Morse Wet Reagent Feeders
1—New Morse Cone Type Dry Reagent Feeder

### HOISTS — ELECTRIC

1—10 HP Vulcan #0 Single Drum
1—15 HP Morse New Single Drum
1—20 HP H&B Single Drum
1—22 HP Vulcan Single Drum #1½
1—30 HP Vulcan Double Drum
1—30 HP Vulcan Single Drum
1—37 HP Single Drum
2—52 HP Vulcan #4½ Single Drum
1—50 HP Fairbanks-Morse Single Drum
1—60 HP H&B Single Drum
1—60 HP Vulcan #23ELF Single Drum
4—100 HP Box Single Drum
1—112 HP Vulcan Single Drum
2—150 HP Vulcan Single Drum
1—375 HP Dillon-Box Single Drum
1—600 HP Box Single Drum
1—22 HP Vulcan #1½ Double Drum
1—60 HP Ottumwa Double Drum
1—40 HP American 3 Drum
1—80 HP Thomas 3 Drum
1—80 HP Lidgerwood
1—80 HP Clyde 3 Drum

### CRUSHERS

4—2¼" x 3½" New Morse Lab Jaw Crushers
5—4" x 6" New Morse Lab Jaw Crushers
1—9" x 15" Wheeling Jaw Crusher
1—9" x 15" Farrell Jaw Crusher
1—8" x 24" Rogers Jaw Crusher
1—8" x 36" Universal Jaw Crusher
1—11" x 18" Universal Jaw Crusher
1—24" x 13" Farrell Jaw Crusher
1—10" x 16" Hercules Jaw Crusher
1—10" x 16" Universal #3M Jaw Crusher
1—20" x 36" Austin-Western Jaw Crusher
1—36" x 48" Jeffrey Flextooth Crusher
1—26" x 18" Williams Hammermill
1—30" x 17" Williams Hammermill

### CONCENTRATING TABLES

1—#12 New Wilfley Half Size Table
1—#6 Wilfley Table
6—Deister Plat-O Tables

*Send for Catalog 521E*

## MORSE BROS. MACHINERY COMPANY

**2900 Brighton Blvd. P.O. Box 1708 Keystone 5261 DENVER, COLORADO**

## GUARANTEED USED EQUIPMENT BARGAINS

| | |
|---|---|
| 1—3" Wilfley Sand Pump | $350.00 |
| 1—14' x 50' Conveyor — Steel Frame — Motorized | 600.00 |
| 1—6½' x 5' Conditioner—Steel Tank — Motorized | 500.00 |
| 1—18" x 12' Belt Feeder — Steel Frame w/1 H.P. Gear Motor | 325.00 |
| 1—26" Face Dings Magnetic Pulley, complete with Charger, etc. | 750.00 |
| ¼ H.P. New Sgl. Ph. Motors | 12.00 ea. |
| 1/3 " " " " " | 20.00 ea. |
| ½ " " " " " | 26.50 ea. |
| 10 H.P. Flot Machine Motors | 135.00 ea. |
| 15 " " " " | 175.00 ea. |
| 20 " Agitator Motors | 200.00 ea. |

**Florence Machinery & Supply Co.**
**904 Equitable Bldg. Denver 2, Colo.**

## RELAYING RAIL

*All Sizes*
**Track Accessories**
**LEFTON INDUSTRIAL CORP.**
***Genl. Office:* 212 Victor St.**
**St. Louis 4, Mo.**

**A.G.**
**DIESEL ENGINES • GENERATOR SETS**
**10 TO 2000 KW • AC&DC • GUARANTEED**
**SCHOONMAKER CO., INC.**
50 CHURCH ST. NEW YORK 7, N. Y.
**Plants: SAUSALITO (S.F.) CAL., JERSEY CITY, N.J.**

## FOR SALE 8" Line Pipe

**250,000' 8⅝" O.D.**

**.322 Wall—28.55 lb. Lapweld**

All used, No. 1 Grade, Machine Cleaned, Straight, 20' SRL, Ends Beveled. Suitable Installation Oil, Water or Gas Pipe Line Systems. 850 to 900# PSI. Large Additional Quantities Same Size in Process Taking Up and Reconditioning. Priced Attractively Prompt Shipment Carrollton, Mo.

**Write — Wire — Phone**

**HUMBOLDT-CHICAGO PIPELINE PROJECT**

**125 W. 3rd St. Tulsa, Okla.**

**Phones 2-9128 — 54-4229**

## *NEED AIR?*

**CALL**

**AMERICAN AIR of JERSEY**

**AIR FOR SALE OR RENT SINCE 1902**

**GAS • DIESEL • STEAM • ELECTRIC**

**NEW AND QUALITY REBUILTS**

### STATIONARY

80 CFM 6x5 Worthington HP—10 HP Elec
122 CFM 7x7 Worthington HP—20 HP Elec
170 CFM 6¼x4½ Davey VB9—25 HP Elec
242 CFM 125 PSI 8 x 7 Joy WG-9—40 HP Elec
270 CFM WL-60—Joy Gas and Elec 50 HP
294 CFM 125 PSI 10x11 Worthington HB
364 CFM 20 PSI 12 x 7 Gardner Denver RX
368 CFM 100 PSI 12 x 10 IR-ER-1
552 CFM 125 PSI 13 8x10 Ingersoll Duplex
931 CFM 55 PSI 17x13 Chicago T-B
1085 CFM 35 PSI 20x12 Pennsylvania

**MANY OTHERS TO CHOOSE FROM**
**AFTERCOOLERS — AIR RECEIVERS**

### PORTABLE

55 CFM Lindsay (Gas)
60 CFM LeRoy-Worth (Gas)
105 CFM Joy-Worth-CPT (Gas)
160 CFM Worthington (Gas)
210 CFM Worthington (Gas & Diesel)
270 CFM Joy w/Buda Power Unit-Skids
315 CFM Worthington (Gas & Diesel)
500 CFM Worthington (Diesel)
600 CFM Worthington (Diesel)

### VACUUM PUMPS

180 CFM 10 x 4 Ingersoll—10 HP
354 CFM 14 x 5 Penn—15 HP
434 CFM 14 x 7 Ingersoll 15-20 HP
800 CFM 18 x 9 Worthington—30 HP
1635 CFM 24 x 11 Chicago—60 HP
5881 CFM 30 x 30 x 12 Ingersoll XVH

*American*
AIR COMPRESSOR CORP.
57th ST. & DELL AVE. NORTH BERGEN, N. J.
Telephone UNion 5-4848

# FOR SALE

## 12" Pipe

**150,000'—12¾" O.D. .375**

**Wall—49.56 lb. Lapweld**

All Used, No. 1 Grade, Machine Cleaned, Straight, 20' SRL, Ends Beveled. Suitable Installation Oil, Water or Gas Pipe Line Systems. 850 to 900# PSI. Large Additional Quantities Same Size in Process Taking Up and Reconditioning. Priced Attractively Prompt Shipment Carrollton, Mo.

**Write — Wire — Phone**

**HUMBOLDT-CHICAGO PIPELINE PROJECT**

**125 W. 3rd St. Tulsa, Okla.**

**Phones 2-9128 — 54-4229**

# FOR SALE

## PLACER DREDGE HULL AND SUPERSTRUCTURE

**A standard type structural steel placer dredge hull and superstructure, in good condition, total weight approximately 855 tons, is available in California. The hull meaures 165' x 68' x 11'-6". It is riveted but can be readily cut into shipping sections for re-assembly. This hull and superstructure is available because its dredging has been completed and the machinery removed. It could be moved and used for mining purposes or gravel dredging at only a small part of the cost of equivalent new material. Details can be obtained by writing:**

**YUBA MANUFACTURING COMPANY**

**351 California Street**
**San Francisco 4, California**

# PRESSURE VESSELS

**Suitable Air Receivers—Gas Absorbers Fractionators—Hydraulic Accumulators, Etc.**

**13—10' ID dia. x 40' long x 2½" to 3" shell. Heads 3½" to 3". WP 600 and 500 psi.**

**6—8' ID dia. x 40' x 2" to 2½" shell. Head 2¼". WP 500 psi.**

**All used, excellent condition, code welded construction, manufactured by A. O. Smith. Priced low for prompt shipment East Chicago, Ind. Prints, prices available upon request.**

**MID-STATES PIPE & SUPPLY CO.**

**Box 2534 Phone 2-9128 Tulsa, Oklahoma**

## TRANSFORMERS

| QU. | KVA | MAKE | PHASE | VOLTAGE |
|---|---|---|---|---|
| 3 | 750 | Pitts. | 1 | 23,000-2300 |
| 3 | 667 | Wagner | 1 | 22,000/11,000-2300/4000 |
| 3 | 500 | G.E. | 1 | 22,000/11,000-2300/4000 |
| 3 | 333 | G.E. | 1 | 13,200-2300 |
| 3 | 250 | G.E. | 1 | 2400-240/480 |
| 2 | 150 | G.E. | 3 | 2400/4150-240/480 |
| 3 | 100 | G.E. | 1 | 33,000/2300 |

## MOTOR GENERATOR SETS

| QU. | KW. | MAKE | R.P.M. | VOLTS D.C. | VOLTS A.C. |
|---|---|---|---|---|---|
| 1 (3-U) | 2400 | Whse. | 720 | 600 | 4800/2400 |
| 2 | 1200 | Whse. | 720 | 600 | 2300 |
| 1 | 500 | C.W. | 720 | 275 | 2300/440 |
| 1 | 400 | C.W. | 1200 | 125/250 | 440 |
| 1 | 300 | G.E. | 720 | 275 | 2300 |
| 2 | 200 | G.E. | 720 | 250 | 2300/440 |
| 1 | 150 | G.E. | 720 | 250 | 2300/440 |
| 1 | 100 | Whse. | 900 | 275 | 2300 |
| 1 | 100 | C.W. | 1200 | 125 | 440/220 |
| 1 | 85 | C.W. | 1200 | 250 | 4000/2200 |

## SLIP RING MOTORS

**3-Phase, 60-cycle**

| QU. | H.P. | MAKE | TYPE | VOLTS | R.P.M. |
|---|---|---|---|---|---|
| 1 | 1500 | G.E. | MT-498 | 2300 | 357 |
| 1 | 1200 | G.E. | MT-24 | 2300/4160 | 300 |
| 1 | 1200 | G.E. | MT-26 | 2300 | 277 |
| 1 | 600 | G.E. | MT-20 | 2300 | 360 |
| 1 | 500 | Al.Ch. | ANY | 2300 | 514 |
| 2 | 500 | G.E. | I-16-M | 2300 | 450 |
| 2 | 400 | G.E. | MT-412 | 2300 | 450 |
| 1 | 300 | G.E. | I-17A | 2300 | 600 |
| 1 | 250 | Whse. | CW-937 | 440 | 1200 |
| 1 | 250 | Al.Ch. | ANY | 440 | 720 |
| 1 | 250 | G.E. | MT-414 | 2200 | 300 |
| 1 | 200 | G.E. | I-17A | 2200 | 450 |
| 1 | 150 | Al.Ch. | ANY | 440 | 720 |
| 1 | 125 | G.E. | MT-557 | 2200 | 1200 |
| 2 | 100 | G.E. | I-15A | 2300 | 495 |

**T. B. MAC CABE COMPANY**

**4310 Clarissa St., Philadelphia 40, Pa.**

**DAvenport 4-8300**

**Rotary Dryers—4½' x 30', 5 x 30, 5½ x 40, 5 x 50, 6 x 60 & 11 x 75'.**
**Tube & Ball Mills—5' x 22'—5½' x 20'—5½' x 8', 4½' x 40'— 7' x 120', 8' x 125' & new 6½' x 150' Kilns.**
**Jaw Crushers—From 10" x 16" up to 40" x 48".**
**Crushing Rolls—From 12" x 24" up to 54" x 24".**
**Sturtevant Rotary fine crushers—No. 0—No. 2—Ball Mills 7 x 8'—6 x 12 & 8 x 6.**
**Harding Mills 1—6' x 22' & 5' x 22".**
**Ring Roll Mills—Sturtevant No. 1—No. 2 duplex. 5'—16' & 18' Herreschoff furnaces.**
**Gyratory crushers. No. 6 to No. 12.**
**222—322 Allis-Chalmers Hydrocone Crushers**
**Magnetic separators—Jigs—screens—classifiers, thickeners, air separators & filters.**
**5'—6' & 7' dia. Rod Mills.**
**6"—10"—14"—16" McCully Superior gyratory crushers.**
**New Dryers—Kilns, Dust Collectors & Lime Hydrators.**

**W. P. Heineken, Inc.**
**50 Broad Street, New York**

**Mill:** 7x5 Marcy w/440-v slipring motor
**Mill:** 5x5 Marcy w/grooved pulley
**Crusher:** 24x36 Pioneer w/new parts
**Crusher:** 15x28 Pacific w/440-v motor
**Battery Loco:** Mancha Titan 3½-Ton
**Hoist:** 125 hp Hendy 2-drums 48" dia.

**PAUL F. SMITH**

**39 W. Adams St. — Phoenix, Arizona**

# IR DRILL SHARPENERS

## FOR SALE

**Model IR — 40 complete with shank and bit punch, shanking device, dies, dollies, gauges, punch pins and various other parts. New, excellent condition. Priced at about one third of original cost. Packed for export.**

**FS 4395 Engineering & Mining Journal**

**330 W. 42 St., New York 36, N.Y.**

# FOR SALE

**1—10'6" D x 112' L Rotary Kiln**
**1—6' D x 16' L Steel Ball Mill**
**3—4'6" D x 12' L Pebble Mills**
**4—Muffle Furnaces each with 2 chrome nickel alloy tubes 24" dia. x 8'6" L.**
**1—Jeffrey Pivoted Bucket Carrier, 185 lin. ft, 16" x 18" piv. bkts.**

**LIQUIDATING & DISMANTLING COMPLETE LITHOPONE MFG. PLANT**

**PERRY EQUIPMENT CORP.**
**1419 N. 6th Street, Phila. 22, Pa.**

**ELECTRICAL WIRE AND CABLE**

***YOUR BEST SOURCE . . .***
- **for every industrial and power application**
- **odd lengths—long and short—reasonably priced**
- **largest stock in Midwest**

**Let us quote on requirements—send your inquiries**

***QUICK . . . from stock***
**We'll also buy your Surplus**
**Branch Offices: Houston—Yukon 5547**
**Los Angeles—ANgeles 3-5148**

**UNIVERSAL Wire and Cable Co.**
**2664 N. Clybourn Ave., Chicago 14, Ill.**
**EAstgate 7-4777 Code: UNIWIRE**

# GOLD DREDGE

**For sale in New Zealand complete with spare parts and equipment, electrically operated steel hull dredge with 16 cubic foot buckets dredging forty feet below water level.**

**Grey River Dredging Co., Ltd.**
**Hokitika, New Zealand**

## LEGAL NOTICE

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF

ENGINEERING AND MINING JOURNAL published monthly at Philadelphia, Pa. for October 1, 1954.

1. The name and address of the publisher, editor, managing editor, and Advertising Sales manager is: Publisher, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 36, N.Y.; Editor, R. H. Ramsey, 330 West 42nd Street, New York 36, N.Y.; Managing editor, A. W. Knoerr, 330 West 42nd Street, New York 36, N.Y.; Advertising Sales manager, C. J. Coash, 330 West 42nd Street, New York 36, N.Y.

2. The owner is: McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 36, N. Y.; Stockholders holding 1% or more of stock: Donald C. McGraw and Willard T. Chevalier, Trustees for Harold W. McGraw, Donald C. McGraw and Elizabeth M. Stolzfus, all of 330 West 42nd Street, New York 36, N. Y.; Donald C. McGraw and Harold W. McGraw, Trustees for Catherine M. Rock, 330 West 42nd Street, New York 36, N. Y.; Donald C. McGraw, Executor of the Estate of Curtis W. McGraw, 330 West 42nd Street, New York 36, N. Y.; Donald C. McGraw, 330 West 42nd Street, New York 36; N. Y.; Mildred W. McGraw, Madison, New Jersey; Grace W. Mehren, 536 Arenas Street, LaJolla, California; Touchstone & Company, c/o Wellington Fund, Inc., Claymont, Del.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

McGRAW-HILL PUBLISHING COMPANY, INC.
By J. A. GERARDI, Vice Pres. & Treas

Sworn to and subscribed before me this 14th day of September, 1954.

[SEAL] ELVA G. MASLIN.
(My Commission expires March 30, 1956)

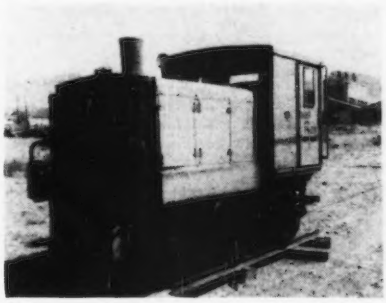
# USED—REBUILT MACHINERY

### BALL MILLS
1—75 Marcy, grate dischg, late model w/200 HP Motor
1—5 x 5 Eimco
2—4 x 5 Eimco & CIW
3—6 x 22" Hardinge w/50 HP Mtrs.
1—5 x 6 Allis Chalmers
1—7 x 48" Hardinge w/150 HP Mtr.
1—7 x 36" Hardinge, w/100 HP Mtr.

### CLASSIFIERS
1—48" x 30' Akins, Submerged Spiral
1—8' x 26' Denver Duplex Rake
4—6' x 25' Dorr Duplex Rake
1—6' x 14' Hardinge Countercurrent

### CONVEYORS, Belt
1—48" wide x 80' centers, modern steel understructure
1—36" x 120' centers, Jeffrey steel bridge frame, with catwalk
2—20" x 55' centers w/2 HP gearmtrs.
1—18' x 55' centers, bridge steel
1—18' x 55' centers, bridge steel frame in sections, like new.

### CRUSHERS
1—9 x 30 Telsmith Jaw, Roller Brg.
1—9 x 36 Universal Jaw
2—10 x 16 Traylor Jaw
1—36 x 16 Crushing Rolls



### MAGNETIC HEAD PULLEYS
1—48" x 17" dia. Cutler Hammer, with 5 KVA MG set
1—16" Dings w/M-G set

### GENERATORS AND DIESELS
1—250 KW 480 v AC Diesel Gen. Set with GM Engine complete
2—112 KVA 480 v AC Diesel Gen. Sets with Cat D17000 engines
2—50 KW DC Mtr. Generator Sets 250 v DC, 2200 v AC

### MUCKING MACHINES
10—Eimco 12-B Rebuilt, 18-24 ga.

### LOCOMOTIVES
7—Mancha Titan A & B, Rebuilt 18 or 24 gauge
1—Goodman 5-ton trolley, 42" ga.
1—Plymouth 10-ton diesel, late model, std. RR gauge. See picture.

### TUGGER AND SLUSHER HOISTS
3—I. R. HNNIJ 2-drum air
1—I. R. A5NNOH 2-drum air
4—I. R. 25MNN3D 3-drum, electric
1—Joy 25 HP 3-drum electric
2—I. R. 20 MN2D 2-drum electric
2—I. R. 15NN1G 2-drum electric
4—I. R. D6UL one-drum air

### SAND PUMPS, fully rebuilt
1—2" Wilfley, rubber lined
4—4" Wilfley, iron runner
2—2" Wilfley, iron runner
2—8" Wilfley, rubber lined
1—4" Wemco, iron lined

### THICKENERS
3—40' x 10' Eimco mechanisms & superstructures with gearmtr. drives

**1000 Additional Items • Write for Full Details**

## MACHINERY CENTER, INC.
**808 Newhouse Building • Salt Lake City, Utah**
**Phone 3-3973**

---

# EQUIPMENT

***Latest type Metallurgical and Chemical Equipment***
**EXCELLENT CONDITION**

Hardinge Conical Ball Mill 10'x48"
Oliver All Iron Rotary Vacuum Filters
Buflovak Twin Drum Dryer
Dorr Type A Thickeners
Allis-Chalmers Type 222 Gyratory Crusher
Link Belt Screw & Belt Conveyors
Norblo & Sly Dust Collectors
Dorr, Morris, Worthington process pumps
Research Corp. Electrostatic Precipitator

The above items include all auxiliary equipment with individual motor and control 220/440/3/60. The equipment may be inspected on foundations.

***Complete List with Specifications Available.***

## *THE* VULCAN DETINNING CO.
**SEWAREN, N. J.**

---

## WORLD'S LARGEST INVENTORY

FREE CATALOG

MOTORS—GENERATORS—TRANSFORMERS
New and Guaranteed Rebuilt
1 H.P. to 2500 H.P.

ELECTRIC EQUIPMENT CO.
P. O. BOX 51, ROCHESTER 1, N.Y.

---

# FOR SALE
# 8" & 12" Pipe

**FOR MEDIUM PRESSURE PIPE LINE SERVICE— ROAD CROSSINGS—PILING AND STRUCTURAL PURPOSES**

**200,000' 8⅝" O.D. .322 Wall 28.55# Lapweld**

**100,000' 12¾" O.D. .375 Wall 49.56# Lapweld**

All machine cleaned, commercially straight, 20' single random lengths, ends beveled, used good condition. Priced low, prompt shipment, Welda, Kansas, Grandview and Carrollton, Mo.

**Write — Wire — Phone**

## HUMBOLDT-CHICAGO PIPELINE PROJECT
**125 W. 3rd St. Tulsa, Okla.**
**Phones 2-9128 — 54-4229**

---

**REDUCTION CRUSHER:** Symons Cone, 3 ft. standard, with quantity spare parts.

**JAW CRUSHERS:** Allis Chalmers 42 x 40, 48 x 36 and 36 x 24, with motors and drive. Rebuilt.

**DENSIFIER:** Wemco 48" x 27'3", double pitch, flared tank, 5 H.P. vari-drive motor. (NEW, NEVER USED)

**PULVERIZERS:** Marcy 6' x 12', trunnion and bearing type, with 200 H.P., 440 volt motor, with stone or steel lining. Hardinge 5' x 22" Ball Mill complete with motor driven disc feeder, 30 H.P. motor and control.

**DRYERS & KILNS:** 1—10' x 75', single shell, heavy duty, metal lined, complete with motor and drive. 2—5' x 25', single shell. 1—Rotary Kiln 4' dia., 42' long, with firing hood, burners, recording instruments, etc.

**TUGGER HOISTS:** Ingersoll Rand 3 drum, size 50 NNN-4C, 50 H.P. motor, 3 phase, 60 cycle, 220/440 volt.

**MINE HOISTS:** Single and double drum 100 to 1500 H.P., with all electrical equipment. Complete specifications, drawings and photos available.

**MINE HOIST SPECIAL:** Nordberg 1200 H.P., 1400 FPM, one drum clutched, wraps 1100 ft. 1¾" rope, complete with motor and all auxiliary equipment, with or without 95 ft. head frame.

**HOIST MOTORS:**
300 H.P., 435 RPM.
400 H.P., 588 RPM.
600 H.P., 710 RPM.
1200 H.P., 484 RPM.
2200 volt, A.C. with controls.

**DERRICK:** Stiff leg, all steel, 25 tons capacity, 31' mast, 106' boom.

**LOCOMOTIVE CRANE:** Link Belt 25 ton capacity, standard gauge, gasoline powered, cast steel trucks, air brakes, with or without 1¼ yd. Williams clam shell bucket, thoroughly modern, excellent condition. Located Minnesota. For sale or rent.

**LOCOMOTIVES:** 2—65 ton diesel electric, standard gauge, thoroughly modern, excellent condition. For sale or rent.

**OVERHEAD ELECTRIC CRANE:** Shepard Niles 8 ton, 54' span, 4 motor, clam shell bucket operating, 440 volt, 3 phase, 60 cycle.

**TRANSITE PIPE:** 7000 ft. 10" and 14", Class 100, 150 and 200. (NEW)

**BUCKETS:** 2—Concrete 1 yd. capacity, drop bottom. 1—4 yd. dragline, complete. (NEW, UNUSED).

***WE BUY AND SELL EQUIPMENT THROUGHOUT NORTH AND CENTRAL AMERICA.***

## A. J. O'NEILL
**Lansdowne, Pa.**
**Phila. Phones: MAdison 3-8300—3-8301**

# ALPHABETICAL INDEX TO ADVERTISERS

**(This index is published as a convenience to the reader. Every care is taken to make it accurate, but E&MJ assumes no responsibility for errors or omissions.)**


Acker Drill Co., Inc. 186
Acme Machinery Co. 209
Aero Service Corp. 54
Allen-Sherman-Hoff Pump Co. Second Cover
Allis-Chalmers Mfg. Co. (General Machinery) 8, 9, 14, 24, 38
Allis-Chalmers (Tractor Div.) 53
Allison Div. General Motors 26
American Brattice Cloth Corp. 198
American Cyanamid Co. Insert between pp. 50–51
American Mine Door Co. 199
American Steel & Wire Div. 28
Anaconda Wire & Cable Co. 115
Armour Chemical Div. Armour & Co. 205
Armstrong-Bray & Co. 192
Atlas Car & Mfg. Co. 193

Baker & Adamson General Chem. Div. Allied Chem. & Dye Corp. 154
Baldwin-Lima-Hamilton Corp. (Construction Equipment Div.) 191
Baldwin-Lima-Hamilton Corp. (Industrial Locomotive Div.) 17
Barber-Greene Co. 203
Bemis Bro. Bag Co. 168
Bethlehem Steel Co. 12
Birdsboro Steel Fdry. & Mach. Co. 229
Bixby-Zimmer Engineering Co. 198
Booth Co., Inc. 218
Boyles Bros. Drilling Co., Ltd. 113
Brunner & Lay, Inc. 168
Buell Engineering Co. 158
Builders-Providence, Inc., div. of B-I-F Industries, Inc. 178

Card Iron Works Co., C. S. 136
Carrier Conveyor Corp. 63
Caterpillar Tractor Co. 42, 230
Chester Cable Corp. 218
Chicago Pneumatic Tool Co. 46, 47
Chiksan Co. 159
Cleveland Rock Drill Div. Westinghouse Air Brake Co. 10, 11
Cleveland Wire Cloth & Mfg. Co. 182
Collyer Insulated Wire Co. 192
Colorado Fuel & Iron Corp. 56, 57
Colorado Iron Works Co. 50
Columbia-Geneva Steel Div. 28, 49
Columbian Steel Tank Co. 223
Commercial Shearing & Stamping Co. 132
Connellsville Mfg. & Mine Supply Co. 152
Copco-Eastern, Ltd. 139
Copco-Pacific, Ltd. 139
Crane Co. 25
Crucible Steel Co. of America 34
Cummins Engine Co., Inc. 44, 45

Denver Equipment Co. 18, 19
Denver Fire Clay Co. 216
Detroit Diesel Engine Div. General Motors 155
Dings Magnetic Separator Co. 219
Dodge Mfg. Co. 50A
Dorr Co. 103
Dow Chemical Co. 151
du Pont de Nemours & Co., Inc. (Explosives Dept.) 165

Eimco Corp. 13, 51
Electro Dynamic Div. General Dynamics Corp. 145
Elektrokemisk, A. S. 186
Engineering & Mining Journal 170, 171, 212
Engineers Syndicate, Ltd. 194
Ensign-Bickford Co. 137
Euclid Div. General Motors Corp. 143

Falk Corp. 29
Flexible Steel Lacing Co. 178

Galigher Co. 41
Gardner-Denver Co. 27
Garlock Packing Co. 176
Gates Rubber Co. 16
General Cable Corp. 179
Georgia Iron Works Co. 156
Godoy & Co., Inc., E. A. 148
Goodrich Co., B. F. 5
Goodrich Co., B. F. (Tire & Equipment Div.) 183
Goodyear Tire & Rubber Co. 21
Greensburg Machine Co. 167
Grinnell Co., Inc. 195

Harbison-Walker Refractories Co. 184, 185
Hardinge Co., Inc. 146, 147
Harnischfeger Corp. Third Cover
Haynes Stellite Co., div. of Union Carbide & Carbon Co. 206
Hazard Insulated Wire Works 173
Hendrick Mfg. Co. 223
Hercules Powder Co. (Naval Stores Dept.) 188
Hewitt-Robins, Inc. 60, 61
Heyl & Patterson, Inc. 32
Homer Mfg. Co., Inc. 187
Houston Technical Laboratories 166

Industrial Brownhoist Corp. 175
Ingersoll-Rand Co. 3
International Nickel Co., Inc. 214

Johnson Co., C. A. 22, 23
Jones & Laughlin Steel Corp. 43, 64
Joy Mfg. Co. 31, 55

Kennametal, Inc. 216
Kennedy-Van Saun Mfg. & Engrg. Co. 111
Klockner-Humboldt-Deutz, A. G. 200
Koehring Co. 22, 23

Leschen Wire Rope Div. sub. H. K. Porter Co., Inc. 117
LeTourneau-Westinghouse Co. 30
Link-Belt Co. 58
Longyear Co., E. J. 190

Mack Trucks 189
Manhattan Rubber Div. 144
Marion Power Shovel Co. 207
Mayhew Supply Co., Inc. 109
McKee & Co., Arthur G. 135
McLanahan & Stone Corp. 133
McNally Pittsburg Mfg. Corp. 216
Merrick Scale Mfg. Co. 197
Midvale Co. 210
Mine & Smelter Supply Co. 62
Mine Safety Appliances Co. 161

National Filter Media Corp. 128
National Malleable & Steel Castings Co. 211
Naylor Pipe Co. 126
New York Engineering Co. 216
Nordberg Mfg. Co. 36
Northern Blower Co. 174
Northwest Engineering Co. 15

Ohio Brass Co. 153
Oliver United Filters, Inc. 201
Osmose Wood Preserving Co. of America 160

Page Engineering Co. 141
Parsons Co. 22, 23
Patterson Fdry. & Machine Co. 142
Patterson Fdry. & Machine Co. (Canada, Ltd.) 142
Pennsylvania Drilling Co. 216
Permutit Co. 157
Philadelphia Quartz Co. 192
Precision Radiation Instruments, Inc. 167
Punch-Lok Co. 164

Raybestos Manhattan, Inc. 144
Reo Motors, Inc. 182
Riblet Tramway Co. 197
Roebling's Sons Corp., J. A. 20, 129
Rollway Bearing Co., Inc. 169
Roots-Connersville Blower div. of Dresser Industries, Inc. 180
Ryerson & Sons, Inc., J. T. 105

Salem Tool Co. 197
Sauerman Bros., Inc. 127
Scandinavia Belting Co. 196
Searchlight Section 224–227
Seismograph Service Corp. 148
Sheffield Steel Corp. 215
Simplex Wire & Cable Co. 48
Smidth & Co., F. L. 221
Smit & Sons, Inc., J. K. 140
Spang & Co. 149
Sprague & Henwood, Inc. 134
Standard Oil Co. of Calif. 52
Stearns Magnetic, Inc. 163
Stearns-Roger Mfg. Co. 138
Stephens-Adamson Mfg. Co. 208
Straub Mfg. Co. 199
Sturtevant Mill Co. 131
Superior-Lidgerwood-Mundy Corp. 223

Tennessee Coal & Iron Div. 28, 49
Texas Co. 6, 7
Texas Gulf Sulphur Co. 213
Thermoid Co. 217
Thew Shovel Co. 177
Thomas Flexible Coupling Co. 194
Thompson Products, Ltd. 218
Timken Roller Bearing Co. Fourth Cover
Traylor Engrg. & Mfg. Co. 65
Twin Disc Clutch Co. 124, 125

United States Rubber Co. (Mechanical Goods Div.) 122, 123
United States Steel Corp. 28, 49
United States Steel Export Co. 28, 49

Victaulic Co. of America 172
Vulcan Iron Works Co. 150

Walworth Co. 59
Wedge-Wire Corp. 194
West End Chemical Co. 202
West Virginia Steel & Mfg. Co. 162
Western Machinery Co. 121
Western Precipitation Corp. 181
Westinghouse Air Brake Co. Cleveland Rock Drill Div. 10, 11
Wheel Trueing Tool Co. 33
Wickwire Spencer Steel Div. 56, 57
Wilfley & Sons Co., A. R. 66

Yuba Mfg. Co. 130



PROFESSIONAL SERVICES 220


SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hilty, Mgr.


EMPLOYMENT
Positions Vacant 224
Positions Wanted 224
Selling Opportunities Wanted 224
BUSINESS OPPORTUNITIES
Offered 224
NOTICES
Legal 226
PROPERTY
Wanted 226
EQUIPMENT
(Used or Surplus New)
For Sale 224-227
WANTED
Equipment 224


ADVERTISERS INDEX


American Air Compressor Corp. 225
Buckman, Mines 224
Electric Equipment Co. 227
Florence Machinery & Supply Co. 225
Grey River Dredging Co., Ltd. 226
Heineken, Inc., W. P. 226
Humboldt Chicago Pipeline Project 225, 226, 227
Lefton Industrial Co. 225
MacCabe Co., T. B. 226
Machinery Center, Inc. 227
Mid-States Pipe & Supply Co. 226
Morse Bros. Machy. Co. 225
O'Neill, A. J. 227
Perry Equipment Corp. 226
Schoonmaker Co., A. G. 225
Smith, Paul F. 226
Summit King Mines, Inc. 224
Universal Wire & Cable Co. 226
University of Witwatersand 224
Vulcan Detinning Co., The 227
Yuba Manufacturing Co. 226

# ARE HIGH CRUSHING COSTS *CUTTING INTO YOUR PROFITS?*

Still higher output is the most effective answer to today's mounting production costs. Put your tough crushing assignments up to Birdsboro-Buchanan Primary Jaw Crushers. They are engineered and constructed for fast reduction of the hardest rock and ore at minimum cost of both operation and maintenance. For an increasing number of crusher users, the suggestion to "Call in Birdsboro engineers" is becoming standard practice. Their know-how has proved extremely helpful to many firms involved in unusual or difficult crushing problems. This experience is yours for the asking.

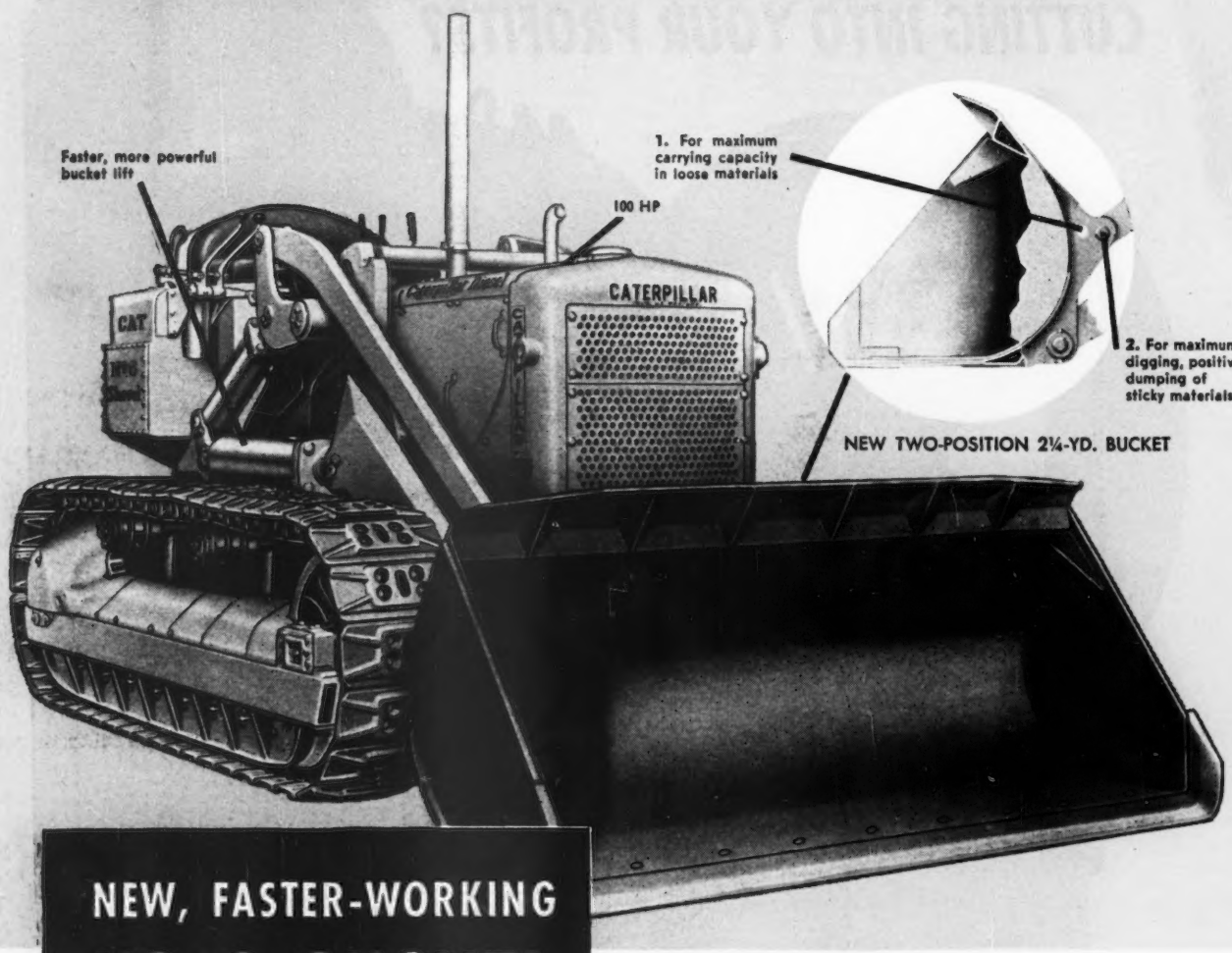
*Designers and Builders of:*
STEEL MILL MACHINERY
HYDRAULIC PRESSES
CRUSHING MACHINERY
SPECIAL MACHINERY
STEEL CASTINGS
Weldments "CAST-WELD" Design
ROLLS: Steel, Alloy Iron, Alloy Steel

CR-3-47-R

# BIRDSBORO

**BIRDSBORO STEEL FOUNDRY & MACHINE CO., BIRDSBORO, PENNA.** Offices in Birdsboro, Pa. and Pittsburgh, Pa.

# ANNOUNCING


Faster, more powerful bucket lift
100 HP
CATERPILLAR
CAT
1. For maximum carrying capacity in loose materials
2. For maximum digging, positive dumping of sticky materials
NEW TWO-POSITION 2¼-YD. BUCKET

## NEW, FASTER-WORKING
# NO. 6 SHOVEL
## at no increase in price

**NEW POWER**—the CAT* Diesel Engine now gives you 100 HP, an increase of approximately 25 per cent—and you get it with Caterpillar ruggedness and economy.

**NEW 2¼-yd. BUCKET** gives you 12½ per cent more capacity, gets heaping loads, dumps cleanly. Exclusive two-position feature gives maximum use of bucket capacity in *any* material: rear position for clean, fast dumping of sticky materials; forward position for carrying heaping loads of loose materials.

**GREATER LIFTING POWER** and speed with new hydraulic pump: its pressure is stepped up more than 40 per cent for fast, positive lifting action under *all* load conditions.

**These extra values cost you no more in price!**

These useful attachments increase your job range: skeleton rock bucket, quarry bucket, heavy-duty narrow bucket and bulldozer blade.

**Versatile new No. 6 Shovel is built to do more work at less cost**

Weight distribution, engine horsepower and bucket capacity are carefully balanced so that the tracks *stay* on the ground for maximum stability.

Your Caterpillar Dealer will be glad to demonstrate the new No. 6 Shovel *on the job*. See him today. And count on him for fast service and genuine factory parts.

Caterpillar Tractor Co., Peoria, Ill., U.S.A.

# CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

**NAME THE DATE... YOUR DEALER WILL DEMONSTRATE**

day after day

# SLAG ...by the carload!

P&H "THE PRIDE OF THE PIT"

Birmingham Slag Co. has just put another P&H 1600 Electric Shovel into operation!

Why does Birmingham Slag go P&H?

The reasons are clear: P&H is the one machine that can consistently dig in steamy, corrosive atmospheres . . . atmospheres like those created when water cools hot slag. P&H Magnetorque* eliminates all DC commutators in the hoist motion — the corrosion trouble spot of ordinary machines. P&H electrical system is simpler, too — designed for shovel service . . . not adapted for it!

Bail pull is another Birmingham Slag consideration. For to reclaim old slag dumps left to "air cooling" requires a machine with stamina . . . a machine capable of digging in concrete hardness and keeping it up all day long. Here, again, P&H fills the bill! For with exclusive Magnetorque on the hoist drive, P&H Electric Shovels have the industry's highest bail pull . . . more power at the digging end — *where it's needed!*

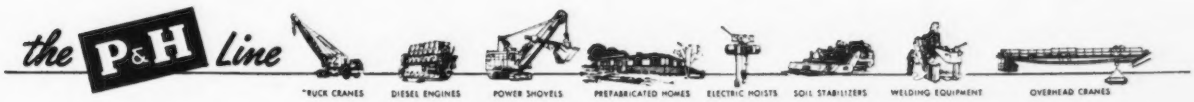
These are the kinds of advanced features you get from P&H. Full facts are in Bulletin X-139. Send for your copy today.

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

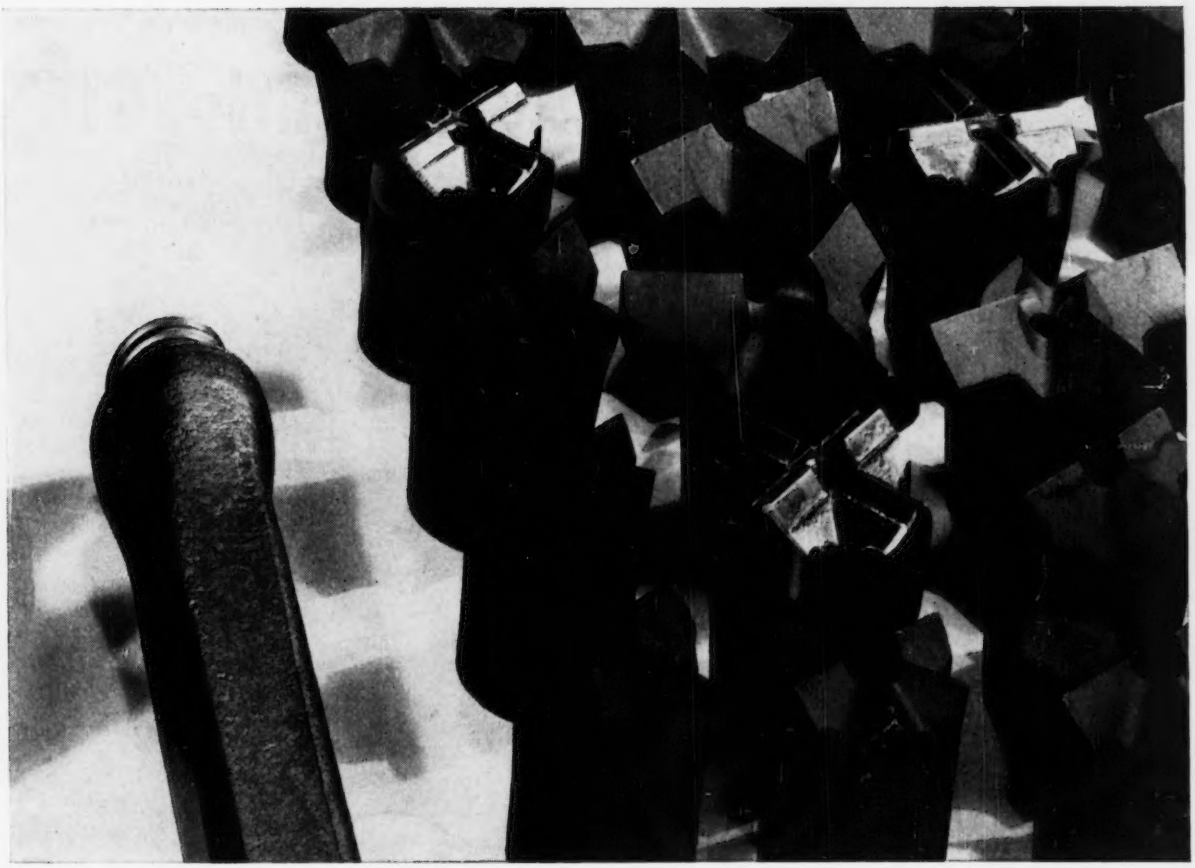
P&H LARGE EXCAVATOR DIVISION

**HARNISCHFEGER**
**CORPORATION**
MILWAUKEE 46, WISCONSIN

the P&H Line



# SAVE TIME CHANGING ROCK BITS!



## TIMKEN® multi-use, carbide insert bits, interchangeable on the same drill steel!

TIMKEN® multi-use and carbide insert bits save you valuable drilling time because they're interchangeable on the same steel. In a minute, a driller can unscrew one type of Timken bit and screw on another type. There's no time wasted going after another set of drill steels.

You save money, too, with Timken rock bits. Drillers can change to the most economical bits as the ground changes. And the need for keeping large inventories of drill steels is eliminated.

In either type of Timken rock bit—multi-use or carbide insert—you're assured of two important advantages. 1) Timken rock bits are made from electric furnace Timken alloy steel. 2) A special shoulder union keeps drilling impact from damaging threads.

Got a drilling problem you want solved? Call on our rock bit engineers. They're recognized experts in cutting drilling costs. And, of course, there's no obligation for this service. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

### HOW TIMKEN MULTI-USE BITS SAVE YOU MONEY

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

### WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant gage holes, small-diameter holes, very deep holes.

*... your best bet for the best bit... for <u>every</u> job*

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.